EAST MALLING
ANNUAL RESEARCH REPORTS

1954-1961

ABSTRACTS AND INDEX

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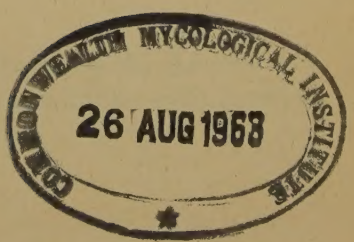

The Kent Incorporated Society for Promoting Experiments in Horticulture

ABSTRACTS

AND

INDEX

TO THE

ANNUAL RESEARCH REPORTS

1954—1961

EAST MALLING RESEARCH STATION
MAIDSTONE, KENT

Published — 1963

The correct abbreviation of the title of this volume is:—
Rep. E. Malling Res. Sta.—Abstracts and Index 1954—1961 (1963)

PRINTED IN GREAT BRITAIN BY HEADLEY BROTHERS LTD
109 KINGSWAY LONDON WC2 AND ASHFORD KENT

FOREWORD

The first volume of Abstracts and Index, covering the Annual Research Reports of East Malling Research Station from 1913 to 1953, appeared in 1957. It was then pointed out that the Annual Indices were inadequate to make the information in these reports readily accessible to the grower and to the research worker; new members of staff faced increasing difficulty in relating their research to the results of past experiment and the younger grower equally required an accurate and speedy guide to available information.

That volume quickly proved of real value to all those concerned in making full use of the results of research on fruit and hops that have been recorded in the Annual Reports of the Station. The continuing need for such a work of reference is sufficiently demonstrated by the fact that the present volume, covering the Annual Reports of 1954 to 1961, is almost as large as its predecessor covering the first forty Reports.

Growers, advisory officers and research workers will alike, we hope, find the present volume of real assistance. All will wish to thank Mr. Walter for the work he has put into its preparation, abstracting, indexing, cross-referencing and checking and I have particular pleasure in recording our great appreciation of his efforts on our behalf. He is indeed to be congratulated on the fruits of his industry and meticulous care.

F.R.T.

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culture techniques — *see under* Bacteriophages.

field trials — Bordeaux mixture reduced incidence of the leaf-spot phase, but not of stem canker, **1955**, II, 37.

host-parasite relations — investigation begun on origin of stem cankers in young trees, **1958**, II, 25. Inoculations through leaf scars or lenticels unsuccessful, but cankers were induced by inoculations through wounds in the bark or wood between October and April; tissues were most susceptible from November to January, **1960**, II, 24; **1961**, II, 24. Suggestion that cankers in the field probably originate from the infection of the cortex through very small wounds, **1961**, II, 24.

Bactericides — *see under* Bacterial canker, cherries, field trials.

Bacteriophages — viruses infecting bacteria. Used in rapid identification of *Ps. mors-prunorum*, **1957**, II, 22; **1958**, II, 25; and to distinguish between *Erwinia amylovora* and *Ps. syringae*, **1959**, II, 23. Notes on preparation and storage, **1959**, II, 23; **1960**, II, 24. Phage reactions to various *Pseudomonas* spp., **1961**, II, 24.

Bait traps — *see under* Insect catching/counting.

Baldwin — *see under* Black currants, Baldwin.

Bark analysis — *see under* Analysis, chemical, organic, fruit plants.

,, canker, pears — *see also under* Fire-blight disease of pear; Pear blister canker.
a bark canker of Comice trees shown to be a virus disease, **1959**, II, 27.

,, injury investigations, apples — in experiment on potted trees to investigate cause of injuries such as 'pimply bark' and 'bark measles', **1958**, II, 21, these symptoms were induced on Lord Lambourne and Cox, **1959**, II, 20.

,, measles, apples — *see under* Bark injury investigations, apples.

,, necrosis virus — *see also under* Virus diseases, indicator plants, pears.
Swiss clone of Williams' (compatible with quince rootstocks) infected, **1958**, III, 91; successfully heat treated, **1961**, III, 94.

,, split, plums — *see also under* Virus diseases, heat treatment, plums.
notes on **1954**, II, 40. Stoolbeds of Common Plum extensively infected, **1954**, II, 36. Field trial planted to investigate effect on growth and cropping of four varieties, **1957**, II, 24. Trees of Cambridge Gage killed two years after inoculation with a virus from Victoria plum trees with bark split symptoms, **1960**, II, 29.

Barley — *see under* Corn crops and trials.

Baumforth A — used in the raspberry breeding programme as main source of resistance to the Rubus aphid, **1957**, III, 63.

Beauty of Bath — *see under* Apple varieties.

Bedford Giant — *see under* Blackberries, variety and strain trials.

Beetles — *see under* the common names of the beetles.

Belgian Myrobalan — *see under* Rootstocks, plum, resistance to bacterial canker.

Beneficial insects and mites— *see also under* Insect catching/counting; Insect fauna.

parasites–

woolly aphid — *see under* Woolly aphid parasite.

predators–

fruit tree red spider mite — notes on, **1956**, II, 31, 37; **1957**, II, 28; **1958**, II, 31; III, 133; **1959**, II, 30, 31; **1960**, II, 31; **1961**, II, 33. Delayed dormant wash of DNC had marked deleterious effect on hatching of *Psallus ambiguus* and *Blepharidopterus angulatus*, **1954**, II, 38. Deleterious effect of DDT, BHC, tar oil washes, and parathion on predators, resulting in increased mite populations, **1954**, III, 138. Trees sprayed with lime-sulphur developed much higher populations of the fruit tree red spider mite than those sprayed with captan, **1955**, II, 44; **1956**, II, 31. In trials to control codling moth, lead arsenate, toxaphene, and especially DDT were associated with increased mite populations, **1955**, III, 148. **Some observations on the effects of formulation on the persistence of DDT and its toxicity to certain orchard insects and mites**, by R. P. Tew and Joan R. Groves; various formulations of DDT, applied primarily for control of codling moth, showed marked contact toxicity to Typhlodromid mites, leading to increased populations of phytophagous mites, **1956**, III, 152. **A preliminary study of the toxicity of lime-sulphur and other fungicides to *Psallus ambiguus* (Fall.) (*Hemiptera-Heteroptera, Miridae*)**, by W. Reed; in laboratory tests 2½% lime-sulphur was highly toxic, due to release of hydrogen sulphide; toxicity of the dry deposit decreased with age until, at 48 hours, it caused no mortality; 5% captan and 4% dispersible sulphur not toxic, **1958**, III, 127. Higher density of black-kneed capsid on Worcester Pearmain trees than on Cox, **1959**, III, 110. Use of DDT in August 1957 resulted in high mite populations in 1958; these were checked by the reappearance of the black-kneed capsid in 1959 and brought under control in 1960, **1960**, II, 31. In trial to investigate effect of annual applications of DDT/BHC and lead arsenate/nicotine when applied at the green-cluster stage, **1959**, II, 30, *Psallus ambiguus* had been eliminated by the second year by DDT/BHC, but there was little effect on other predators, and no evidence of any marked increase in phytophagous mites, **1960**, II, 31; by the third year, populations of *M. ulmi* and *Bryobia rubrioculus* were highest on the BHC/DDT plots, **1961**, II, 33. **Further studies of the toxicities to predatory mirids occurring in apple orchards**, by R. C. Muir; 0·1% captan, 0·6% dispersible sulphur, 0·6% colloidal sulphur, 0·1% zineb, 0·1% dodine acetate, and 0·025% dinocap were innocuous to the nymphs of *Psallus ambiguus* and *Blepharidopterus angulatus*. 2·5% lime-sulphur was highly toxic, but dilute sprays containing less than 1% lime-sulphur were harmless, **1961**, III, 109.

general — **Some predacious insects of fruit trees: capsid bugs**, by Elsie Collyer, **1954**, IV, 155. **Some predacious insects of fruit trees: lacewings, ladybirds, and hover flies**, by Elsie Collyer, **1955**, IV, 155. **Predacious spiders and mites on fruit trees**, by D. A. Chant, **1956**, IV, 175.

BHC — *see under* Beneficial insects and mites, predators, fruit tree red spider mite; Insect fauna; Soil residues, BHC; Spraying programme; and under the common name of the insect to be controlled.

Biennial bearing– *see also under* Mineral composition, apple plants; Pear cropping. notes on, **1954**, II, 23; **1955**, II, 26; **1956**, II, 11; **1957**, II, 7; **1958**, II, 9; **1959**, II, 7; **1960**, II, 9; **1961**, II, 9.

Biennial bearing–*continued*

deblossoming trials — tar oil, DNC, endothal, and tri-iodobenzoic acid all equally effective in removing blossoms, **1955**, 11, 26, and in following year these trees carried greater crops than the controls, **1956**, II, 11. Naphthalene acetamide as a blossom thinning spray gave encouraging results, **1958**, II, 9, but in repeat trial it severely reduced yield though improving fruit size, **1959**, 11, 7. CIPC unsuccessful as total deblossoming spray, **1958**, II, 9. In pruning trial with Laxton's Superb, some trees were deblossomed for the first six years; those pruned on the regulated and renewal systems became strongly biennial, but *not* those pruned on the established-spur system, **1959**, IV, 126.

defoliation trials–

with chemicals — notes on, **1960**, II, 9. Trials started to study effects on fruit bud formation of spraying whole trees with copper sulphate, **1955**, II, 26; good fruit bud formation in following year, **1956**, II, 11. 1½% copper sulphate induced more regular cropping of Laxton's Superb and increased the total crop over the first two years; timing of sprays is critical, **1959**, II, 7.

by hand — in trials using parts of trees, defoliation after early June resulted in severe reduction in the amount of fruit bud formed, **1956**, II, 11; similar results with whole trees, **1957**, II, 7. **Some trials of the effect of defoliation upon cropping of apples**, by Moya H. E. Davies; hand defoliation of Winter Sunshine forty days after full bloom reduced fruit bud formation, leaf areas, and shoot growth for remainder of the season; when carried out ten days after full bloom it did not depress fruit bud production. Defoliation of Worcester Pearmain resulted in dropping of the entire crop, **1958**, III, 53.

fruit thinning trials — naphthalene acetamide, used as possible fruit thinning agent, gave similar results to naphthalene acetic acid, **1955**, II, 26, and had no effect on cropping the following year, **1956**, II, 11.

pruning effect — in pruning trial with Laxton's Superb, established-spur pruning reduced the intensity of biennial bearing, **1959**, IV, 124.

Big bud — *see under* Black currant reversion.

,, mite — *see under* Black currant gall mite.

Bindweed — *see under* Weedkillers, black currants.

Biochemistry Section — general review of research work, **1954**, II, 32; **1955**, II, 36; **1956**, II, 21; **1957**, II, 17; **1958**, II, 19; **1959**, II, 17; **1960**, II, 18.

Bitter pit — *see under* Functional disorders, bitter pit.

Black bean aphid (*Aphis fabae*) — *see under* Hop mosaic, virus vector studies.

Blackberry(ies)–

propagation — *see under* Propagation, blackberries.

sudden wilt — *see under* Sudden wilt, blackberries.

variety and strain trials — clone of Thornless Evergreen from Oregon being raised for trial, **1955**, II, 28; of medium vigour, the fruit ripening late, **1956**, II, 13; virus-tested, **1957**, II, 9. In trial comparing a virus-tested clone of Bedford Giant and a thornless sport, **1958**, II, 10, both clones yielded a maiden crop of about 30 lb per plant (10 tons per acre), **1960**, II, 10; their fruit, however, was small and lacking in firmness, **1961**, II, 10.

virus diseases — *see under* Rubus stunt virus; Sudden wilt, blackberries.

Black currant(s)–

Baldwin — *see under* Black currant leaf spot; Black currant reversion; Black currant varieties; Black currants, vein pattern virus; — —, yellows virus.

Black currant(s)–*continued*

big bud mite — *see under* Black currant gall mite.

blossoming — **A black currant variety trial**, by A. P. Preston; notes on blossoming characteristics and order of blossoming of seven varieties, **1954**, III, 78.

Boskoop Giant — *see under* Black currant dieback; Black currant reversion; Black currant varieties; Fruit set, black currants.

botrytis — *see under* Black currant dieback.

breeding — *see under* Breeding, soft fruits.

cropping — *see under* Black currants, Experimental Farm; Black currant varieties; Irrigation, black currants.

cuttings — *see under* Propagation, black currants.

Daniels' September — *see under* Black currants, variegation.

dieback (*Botrytis cinerea*) — in variety trial, Boskoop Giant and Seabrook's Black were the most severely affected, **1954**, III, 79.

Experimental Farm — acreage, cropping, and general notes, **1957**, I, 2; **1958**, I, 2; **1959**, I, 2; **1960**, I, 2; **1961**, I, 2.

frost damage investigations — *see under* Frost damage investigations, black currants.

fruit set — *see under* Fruit set, black currants.

gall mite (*Phytoptus ribis*, syn. *Eriophyes ribis*) — *see also under* Black currants, vein pattern virus; Black currant reversion; Harvest residues, black currants; Spray damage investigations, black currants.
notes on, **1956**, II, 32; III, 133; **1957**, II, 30; **1958**, II, 32; **1960**, II, 33; **1961**, II, 32. Fluoroacetamide and Thiodan, applied just before and towards the end of blossoming, compared with endrin, **1959**, II, 31; 0·04% endrin the most effective, **1960**, II, 32. Cause of a common leaf malformation, independent of that caused by reversion virus, **1961**, II, 30.

Goliath — *see under* Black currant reversion.

-gooseberry hybrids — *see under* Breeding, soft fruits.

growth measurement studies — *see under* Statistical studies, black currants.

harvest residues — *see under* Harvest residues, black currants.

irrigation — *see under* Irrigation, black currants.

leaf midge (*Dasyneura tetensi*) — **The biology of the black currant leaf midge *Dasyneura tetensi* (Rubs.) in relation to the planning of control measures**, by R. S. Pitcher, **1957**, III, 136.

leaf spot (*Gloeosporium ribis*) — in variety trial, Baldwin was the only one seriously affected, **1954**, III, 79.

manuring — *see under* Manuring, black currants.

marketing — *see under* Marketing, fruit.

Mendip Cross — *see under* Black currant reversion; Black currant varieties; Fruit set, black currants.

propagation — *see under* Propagation, black currants.

pruning — *see under* Pruning, black currants.

reversion — *see also under* Black currant gall mite; Black currants, vein pattern virus.
in variety trial Goliath and Boskoop Giant were worst affected, Baldwin, Mendip Cross and Wellington XXX least, **1954**, III, 79.

'running off' — *see under* Fruit set, black currants.

Black currant(s)–*continued*

sawfly (*Nematus olfaciens*) — observations on, **1957**, III, 134.

Seabrook's Black — *see under* Black currant varieties; Fruit set, black currants.

spray damage — *see under* Spray damage investigations, black currants.

,, residues — *see under* Harvest residues, black currants.

variegation — **Transmission of variegation in black currants**, by Christina E. Ellenberger; yellow variegation and vein banding occur in several varieties, and are prevalent in Daniels' September. Seedlings derived from open pollinated Baldwin developed conspicuous symptoms in the year following inoculation by grafting, but clonally propagated Baldwin and Wellington XXX showed only slight, transient symptoms, **1961**, III, 101.

varieties — *see also under* Breeding, soft fruits.
A black currant variety trial, by A. P. Preston; results of a seven-year trial with seven varieties. Wellington XXX gave the heaviest total crop, and Boskoop Giant the lightest. Mendip Cross suggested as the best early variety, Wellington XXX for mid-season, and Westwick Choice or Baldwin as late varieties, **1954**, III, 78.

vein-banding — *see under* Black currants, variegation.

vein pattern virus — in trial planted in 1954, vein pattern virus decreased the crop of Baldwin by 34% and of Wellington XXX by 52% during the period 1957-60; size of fruits decreased, but little effect on their number, **1960**, II, 29. Symptoms of infection evident on several plantations in Kent; all affected bushes also showed early symptoms of reversion. Transmitted by black currant gall mites, but test plants did not show reversion symptoms, possibly owing to their being masked under glasshouse conditions, **1961**, II, 30.

virus diseases — *see under* Black currant reversion; Black currants, variegation; — —, vein pattern virus; — —, yellows virus.

weedkillers — *see under* Weedkillers, black currants.

wood growth — *see under* Statistical studies, black currants.

yellows virus — in trial planted in 1954, yellows virus decreased the crop of Baldwin by 70% and of Wellington XXX by 71%; obvious stunting effect on bushes, and reduction in both number and size of fruits, **1960**, II, 29.

Blackfly, cherry — *see under* Cherry blackfly.

Black-kneed capsid (*Blepharidopterus angulatus*) — *see under* Beneficial insects and mites, predators, fruit tree red spider mite; Insect catching/counting; Insect fauna.

Blister canker, pears — *see under* Pear blister canker.

Blossom setting — *see under* Fruit set.

,, thinning — *see under* Biennial bearing, deblossoming trials; Histological investigations, apple fruits.

Blossom wilt, pears (*Pseudomonas syringae*) — method of distinguishing the causal organism (*Pseudomonas syringae*) from *Ps. mors-prunorum*, **1955**, III, 121. A bacterial disease which usually attacks the spring blossom in cold, wet weather, **1958**, IV, 151. Use of bacteriophages to distinguish the disease from the early stages of fire-blight, **1959**, II, 23.

Blossoming periods — *see also under* Apple varieties.
in relation to weather conditions at East Malling, **1954**, III, 100; **1955**, III, 74; **1956**, III, 99; **1957**, III, 81; **1958**, III, 65; **1959**, III, 65; **1960**, III, 63; **1961**, III, 69. **Blossoming periods of some fruit trees at East Malling**, by Elizabeth M. Glenn; average dates of

Blossoming periods–*continued*

blossoming for some varieties of plums, apples, and pears, **1956**, III, 89. Myrobalan plums in bloom at the Station on 4th February, the earliest ever recorded here, **1957**, I, 1.

Bordeaux mixture — *see under* Apple canker; Bacterial canker; Fire-blight disease of pear, general; Fungicides, general; Leaf fall, cherries; Spray damage investigations, apples; Spraying programme.

Boron deficiency — *see under* Mineral deficiencies, boron.

Boskoop Giant — *see under* Black currants, Boskoop Giant.

Botrytis cinerea — *see under* Black currant dieback; Fungicide testing, glass-slide method; Raspberry dieback; Strawberry grey mould.

Bradbourne Park, history of — *see under* History of Research Station land (**1954**, III, 56).

Bramble shoot moth (*Notocelia uddmanniana*) — observations on, **1958**, III, 119.

Branch bending — notes on, **1961**, II, 9.

,, breakage, plums — *see under* Tree form, plums.

,, girths, apples — *see under* Statistical studies, apples.

,, ringing — notes on effects, **1961**, II, 18.

Breakdown, apple — *see under* Functional disorders, internal breakdown; — —, low-temperature breakdown.

Breeding– — *see also under* Genetical studies.

hops — notes on the Wye-East Malling breeding project, and the testing of new wilt-tolerant seedlings, **1954**, II, 34; **1955**, II, 38; **1956**, II, 26; **1957**, II, 23; **1958**, II, 26; **1960**, II, 27; **1961**, II, 27.

soft fruits — notes on the currant, gooseberry, and raspberry breeding programmes, **1954**, II, 24; **1955**, II, 28; **1956**, II, 13; **1957**, II, 9; **1958**, II, 10; **1959**, II, 9; **1960**, II, 10; **1961**, II, 11. **Fertile black currant-gooseberry hybrids**, by R. L. Knight and Elizabeth Keep; in order to attempt the transfer of spinelessness from the black currant to the gooseberry by backcrossing, black currant-gooseberry hybrids were treated with colchicine to double their chromosome complement; several of these proved fertile and were successfully backcrossed both to the gooseberry and to tetraploid black currant, **1956**, III, 73; **Developments in soft fruit breeding at East Malling**, by R. L. Knight and Elizabeth Keep, **1957**, III, 62.

top fruits–

apples–

late flowering — notes on, **1954**, II, 23; **1955**, II, 27; **1956**, II, 12; **1957**, II, 7; **1958**, II, 9; **1959**, II, 8; **1960**, II, 9; **1961**, II, 10. **The breeding of late flowering apple varieties**, by H. M. Tydeman; seedlings from a large number of crosses, mostly between Cox and late flowering varieties, as well as self-pollinations, have been obtained; time of leafing out in the spring is used as a basis for preliminary selection, and only the late leafers showing resistance to mildew and scab are retained for further trial, **1957**, III, 68.

resistance to apple scab — notes on, **1960**, II, 9; **1961**, II, 10.

resistance to woolly aphid — notes on, **1954**, II, 38; **1955**, II, 44; **1956**, II, 31; **1957**, II, 28; **1958**, II, 31; **1959**, II, 32.

apple-pear hybrids — good sets obtained, using naphthoxy-acetic acid, **1954**, II, 23.

pears — notes on, **1954**, II, 23; **1955**, II, 27; **1956**, II, 12.

Breeding–top fruits–*continued*

rootstocks–

apple — notes on, **1954**, II, 23.

cherry — notes on programme, which includes crossing Mazzards (*Prunus avium*) and subsequent testing for compatibility and ease of propagation, and selection for dwarfing habit and resistance to bacterial canker, **1954**, II, 23; **1955**, II, 26; **1956**, II, 11; **1957**, II, 7; **1958**, II, 9; **1959**, II, 8; **1960**, II, 10, 24; **1961**, II, 8, 24.

pear/quince hybrids — pear crosses with the pear/quince hybrid, *Pyronia veitchii luxemburgiana*, **1954**, II, 23; **1955**, II, 26; **1956**, II, 12. Beurré Superfin pear crossed with Angers quince, **1957**, II, 7; **1958**, II, 9.

Brevipalpus geisenheyneri — *see under* Flat scarlet mite.

Brompton — *see under* Rootstocks, plum.

Brushing method — *see under* Insect catching/counting.

Bryobia mites — *see under* Mites, Bryobia mite strains.

Bud-break, induced — *see also under* Tree shaping, cherries.
gibberellic acid applied to black currants in the autumn caused bud-break within a week, **1959**, II, 10.

Bud constriction — *see under* Propagation, apples, time of budding.

,, development — *see also under* Biennial bearing, defoliation trials.
notes on effects of removing varying numbers of leaves, or cutting back shoots, **1954**, II, 31; **1956**, II, 19; **1958**, II, 16; **1960**, II, 16. Neither gibberellic acid nor kinetin had any effect on bud growth of plums and cherries, with or without 'tip defoliation', **1961**, II, 17. **The influence of the leaf upon the development of its axillary meristem**, by H. W. B. Barlow and C. R. Hancock; when lateral meristems are induced to grow out by decapitation within the terminal leaf cluster, a pair of organs (prophylls) is found at the base varying between true bud scales and crescents; the role of the subtending leaf is discussed, especially in relation to apical dominance, **1961**, III, 71.

Budding — *see under* Propagation, apples; —, budding.

Bud mutation — *see under* Genetical studies; Incompatibility, pears, on quince rootstocks.

,, -rot disease of hazel (*Gloeosporium* sp.) — epidemic in a commercial plantation, **1959**, II, 24; caused by a *Gloeosporium* sp. and successfully controlled, **1960**, II, 26.

,, ties — *see under* Propagation, budding ties.

Bulk harvesting — in New Zealand and Tasmania, notes on, **1959**, IV, 121.

Bulletins on progress in research– — *see also under* the individual subjects or treatments.

fruit crops — **1956**, IV, 186; **1957**, IV, 164; **1958**, IV, 168; **1959**, IV, 135; **1960**, IV, 134; **1961**, IV, 133.

verticillium wilt and virus diseases of hops — **1956**, IV, 192; **1957**, IV, 161; **1958**, IV, 157, 165; **1959**, IV, 132; **1960**, IV, 141; **1961**, IV, 139.

Byturus tomentosus — *see under* Raspberry beetle.

Caffeic acid — *see under* Apple scab, host-parasite relations; Pear scab, host-parasite relations.

Calcium — *see under* Analysis, spectrographic; Mineral composition, apple plants; Mineral deficiencies, calcium.

Cambium miner (*Dendromyza cerasiferae*) — **A further note on a cambium miner of *Prunus* spp. (*Dendromyza***

Cambium miner (*Dendromyza cerasiferae*)–*continued*

***cerasiferae* Kangas, Agromyzidae, Dipt.**), by R. S. Pitcher, **1955**, III, 139.

Cambridge strawberry varieties — *see under* Strawberries, variety and strain trials.

Canada — **Some impressions of apple orchard practices in Canada,** by G. H. L. Dicker and A. H. M. Kirby, **1954**, IV, 160.

Cane midge, raspberry — *see under* Spraying programme.

,, spot (*Elsinoë veneta*)–

loganberries — notes on fan method of training, with young canes trained above the fruiting canes, to reduce incidence of cane spot, **1959**, III, 48.

raspberries — *see also under* Spraying programme.
notes on breeding for resistance, **1957**, III, 62.

Canker–

apples — *see under* Apple canker.

bacterial — *see under* Bacterial canker.

cherries — *see under* Bacterial canker, cherries.

hops — *see under* Hop canker.

pears — *see under* Bark canker, pears; Fire-blight disease of pear; Pear blister canker.

plums — *see under* Bacterial canker, plums.

Capsid bugs — *see also under* Apple capsid; Beneficial insects and mites, predators, general; Common green capsid.

Captan — *see under* Beneficial insects and mites, predators, fruit tree red spider mite; Fungicide testing, glass-slide method; Skin finish, apples, effect of sprays; — —, pears; and under the common name of the disease to be controlled.

Capture-recapture method — *see under* Insect catching/counting.

Carbohydrate resources — notes on, **1958**, II, 16; **1959**, II, 15; **1960**, II, 16; **1961**, II, 18. **Seasonal changes in the carbohydrate resources of some six-year-old apple trees,** by C. A. Priestley; trees of M.IX/IX, and M.IX/XVI used for serial sampling and analysis to obtain estimations of phloridzin, soluble sugars, starch, and hemicelluloses, **1959**, III, 70.

Carbon dioxide exchange — *see under* Photosynthesis, rate of CO_2 uptake.

Cauliflower disease, strawberries — notes on **1956**, II, 25, 33; **1957**, II, 22, 31. Continued studies on etiological relationship of *Aphelenchoides ritzema-bosi* and *Corynebacterium fascians* showed that the bacterium can survive for long periods in strawberry plants in the absence of the eelworm, **1954**, II, 34, 39. Certain symptoms associated both with eelworms and with *C. fascians* can be caused by the eelworm in the absence of the bacterium, **1955**, II, 37, 45. Strawberry plants into which the bacterium was introduced 15 months previously showed no symptoms until they were inoculated with the eelworm; the bacterium was thus activated and 'cauliflower' symptoms produced, **1958**, II, 25, 33.

Cereal crops — *see under* Corn crops and trials.

Chaenomeles spp. — *see under* Fire-blight disease of pear, general; Virus diseases, indicator plants, apples.

Chat fruit virus — notes on, **1954**, II, 35; **1956**, II, 27; **1957**, II, 24.

Cherry(ies)–

bacterial canker — *see under* Bacterial canker, cherries.

-bark tortrix moth (*Ernarmonia formosana*) — observations on, **1958**, III, 118.

Cherry(ies)–*continued*

blackfly (*Myzus cerasi*) — observations on, **1954**, III, 135; **1955**, III, 133.

blossoming — *see under* Blossoming periods.

breeding — *see under* Breeding, top fruits, rootstocks, cherry.

cropping — *see under* Cherries, Experimental Farm.

crotch angles — *see under* Tree shaping, cherries.

die-back — *see under* Bacterial canker, cherries; Cherry leaf roll.

double-working — *see under* Double-working, interstocks, cherries.

European rusty mottle — *see under* European rusty mottle.

Experimental Farm — acreage, cropping, and general notes, **1954**, I, 16; **1955**, I, 18; **1956**, I, 3; **1957**, I, 1; **1958**, I, 2; **1959**, 1, 2; **1960**, I, 2; **1961**, I, 2.

frameworking — *see under* Tree form, cherries.

fruit moth (*Argyresthia conjugella*) — observations on, **1955**, III, 131; **1957**, III, 133.

fruit splitting — *see under* Fruit splitting, cherries.

grafting — *see under* Tree form, cherries.

grass sward — *see under* Soil management, cherries.

high working — *see under* Tree form, cherries.

leaf roll — *see also under* Eelworms, soil migratory, virus vector studies; Virus testing, cherries.
notes on, **1955**, II, 40; **1956**, II, 27; **1960**, II, 9. **Leaf roll: a virus disease of cherry**, by A. F. Posnette and R. Cropley; main symptoms are upward rolling of the leaves, accompanied by gumming of the trunk and main branches, and by die-back, **1954**, III, 126.

leaf spot — *see under* Bacterial canker, cherries.

little cherry disease — *see under* Little cherry disease.

mahaleb — *see under* Rootstocks, cherry.

manuring — *see under* Manuring, cherries.

mazzards — *see under* Breeding, top fruits, rootstocks, cherry; Rootstocks, cherry.

necrotic line pattern virus — *see under* Cherries, virus diseases.

necrotic ring spot — *see also under* Cherries, virus diseases; Virus diseases, indicator plants, cherries.
notes on, **1958**, II, 27.

propagation — *see under* Propagation, cherries.

rasp leaf — notes on, **1956**, II, 27. Identical with Eckelrader and Pfeffinger diseases in Holland and Switzerland respectively, **1955**, II, 40. Outbreaks associated with either raspberry ringspot virus or raspberry yellow dwarf (arabis mosaic) virus, **1959**, II, 27. Probably caused by raspberry ringspot virus, **1960**, II, 29.

replant problem — *see under* Replant problem.

ring mottle virus — *see under* Cherries, virus diseases.

rootstocks — *see under* Breeding, top fruits, rootstocks, cherry; Propagation, rootstocks, root cuttings; Rootstocks, cherry.

rugose mosaic virus — *see also under* Cherries, virus diseases.

rusty mottle — *see under* Cherries, virus diseases; European rusty mottle.

soil management — *see under* Soil management, cherries

splitting — *see under* Fruit splitting, cherries.

spray damage — *see under* Leaf fall, cherries.

spur wilt — *see under* Bacterial canker, cherries.

Cherry(ies)–*continued*

staddle-working — *see under* Tree form, cherries; Tree shaping, cherries.

stem-building — *see under* Double-working, interstocks, cherry; Tree form, cherries.

tatter leaf — *see under* Cherries, virus diseases.

tree form — *see under* Tree form, cherries.

varieties — *see under* Mother Tree Scheme.

virus diseases — *see also under* Cherry leaf roll; Cherry rasp leaf; European rusty mottle; Little cherry disease; Virus diseases, indicator plants, cherries.
notes on, **1954**, II, 35; **1957**, II, 24; **1958**, II, 27; **1960**, II, 29. **Virus diseases of cherry trees in England. III. Crop reduction caused by some viruses**, by A. F. Posnette and R. Cropley; effects on yields of inoculating young and mature cherry trees with a range of viruses; biggest reduction (72%) caused by necrotic line pattern virus on mature trees of Early Rivers and Turkey Heart, **1959**, III, 92.

virus-tested — *see under* Mother Tree Scheme.

virus testing — *see under* Virus diseases, indicator plants, cherries; Virus testing, cherries.

Chlorbenside — *see under* Acaricides.

Chlorbenzilate — *see under* Acaricides.

Chlorfenson (CPCBS) — *see under* Acaricides.

Chloride injury — notes on, **1955**, III, 59.

Chloroclystis rectangulata — *see under* Green pug moth.

Chlorogenic acid — *see under* Apple scab, host-parasite relations; Pear scab, host-parasite relations.

Chloropicrin — *see under* Verticillium wilt, strawberries, soil fumigation.

Chlorosis, lime-induced — *see under* Mineral deficiencies, iron.

Chlorotic leaf spot virus — *see also under* Rootstocks, apple, virus infection.
cross transmission from apple to pear, **1961**, II, 29.

Chromatography — **The development of chromatography,** by A. E. Flood, **1956**, IV, 179.

Church Fields, history of — *see under* History of Research Station land.

Cinnamic acid — *see under* Apple scab, field trials; — —, host-parasite relations; Gloeosporium rots, sprays/dips; Pear scab, host-parasite relations; Strawberry grey mould.

CIPC — *see under* Biennial bearing, deblossoming trials; Weedkillers, strawberries.

Cladosporium herbarum — *see under* Sooty black mould.

Clay-coloured weevil (*Otiorrhyncus singularis*) — observations on, **1954**, III, 133; **1956**, III, 131.

Clean cultivation — *see under* Soil management, apples, clean cultivation; Soil moisture studies.

Climax — *see under* Strawberries, Climax.

Clouded drab moth (*Orthosia incerta*) — observations on, **1954**, III, 133.

Clover — *see also under* Nettlehead, hops, virus vector studies; Soil management, apples, grass sward.

,, phyllody — *see under* Green petal virus, virus vector studies.

,, witches' broom — not transmitted by *Aphrodes bicinctus*, **1961**, II, 30.

Cobb's mosaic, hops — *see under* Hop mosaic.

Cobnuts, bud-rot disease — *see under* Bud-rot disease of hazel.

Cockchafer (*Melolontha melontha*) observations on, **1954**, III, 133.

Codling moth (*Cydia pomonella*, syn. *Ernarmonia pomonella*)– *see also under* Farm, Experimental, reports; Spraying programme.

general observations on, **1958**, III, 119. Notes on life history and control, **1961**, IV, 120.

insecticide trials *see also under* Harvest residues, apples; Insecticide persistence. notes on, **1954**, II, 39, 42; **1955**, II, 45; **1957**, II, 29; **1958**, II, 31; **1959**, II, 34. **Some field experiments upon the control of codling moth, *Ernarmonia pomonella* (L.) by organic fungicides,** by R. P. Tew and Joan R. Groves; in trials with 0·1% DDT, 0·2% lead arsenate, DNOPC, aldrin, dieldrin and toxaphene, only DDT was effective in reducing damage by the larvae; DNOPC showed acaricidal action, while lead arsenate, toxaphene, and especially DDT were associated with an increase in numbers of fruit tree red spider mite, **1955**, III, 146. Trial started comparing ryania, lead arsenate, DDT, **1956**, II, 32, and diazinon, **1957**, II, 29; ryania, and diazinon intermediate in effect between lead arsenate and DDT, **1958**, II, 31, 35. Addition of a petal-fall spray of 0·2% lead arsenate to the standard 2-spray programme considerably reduced the number of larval entries at the calyx, **1960**, II, 31; when added to a late June/mid-July schedule it improved control from 57% to 93%; three sprays at fortnightly intervals from mid-June gave 80% control, **1961**, II, 32. DDT and azinphos-methyl (Gusathion) reduced infestations by 95% when applied in mid-June, early and late July, and omission of the last spray had a negligible effect, **1960**, II, 31. Applications in mid-June and early July of azinphos-methly at 0·04% reduced infestation by 97%, and an additional spray in late July resulted in 100% control, **1961**, II, 32.

traps **A comparison of bait and light traps for catching codling moths, *Cydia pomonella* (L.),** by Joan R. Groves; mercury vapour light trap is the more efficient, especially at low population densities, **1954**, III, 146. Notes on use in the orchard of corrugated bands and light traps, **1959**, II, 30; **1960**, II, 31.

Colchicine notes on use in breeding fertile black currant–gooseberry hybrids, **1956**, III, 73.

Coleoptile assay method **An artefact in a coleoptile straight growth assay method,** by H. W. B. Barlow, C. R. Hancock and H. J. Lacey; phloridzin solutions which had been in contact with coleoptile sections for the standard test period caused in fresh sections a marked general flaccidity; this toxicity was obviated by sterilizing the solutions before retesting. Disturbance of the gaseous relationships by microbial activity in the small closed tubes used was found to be responsible, and with open tubes no such damage occurred, **1960**, III, 72.

Collar rot, apples (*Phytophthora cactorum*) notes on, **1955**, II, 39. Field trial started to test soil drenches of copper sulphate and copper oxychloride, **1956**, II, 27. **Collar rot of apple trees,** by G. W. F. Sewell; description of symptoms, with suggestions for controlling the disease, **1956**, IV, 168. Marked seasonal activity of the fungus demonstrated, **1957**, II, 24. **Resistance trials of some apple rootstock varieties to collar rot (*Phytophthora cactorum*),** by G. W. F. Sewell and J. F. Wilson; high resistance shown by M.IX, M.VII, MM.106, M.II, MM.III, MM.104, M.XXV and MM.109; low resistance shown by M.26, M.XVI and M.XII, **1958**, IV, 155. Use of resistant rootstock Merton 793, with high working, in New Zealand, **1959**, IV, 118, 120. **Higher**

Collar rot, apples (*Phytophthora cactorum*)–*continued*

budding of apple rootstocks, by N. G. Smith and W. S. Rogers; budding varieties susceptible to collar rot (such as Cox) on to resistant rootstocks is likely to ensure avoidance of the disease, **1960**, III, 49.

Common earwig (*Forficula auricularia*) — observations on, **1956**, III, 132.

,, gooseberry sawfly (*Pteronidea ribesii*) — observations on, **1955**, III, 132.

,, green capsid (*Lygus pabulinus*) — observations on, **1954**, III, 134. Notes on, **1957**, II, 30.

,, leaf weevil (*Phyllobius pyri*) — observations on, **1954**, III, 133.

,, Plum — *see under* Rootstocks, plum.

Composting, hop waste — *see under* Verticillium wilt, hops, composting.

Concentrate spraying — *see under* Spraying, concentrate.

Convolvulus arvensis — *see under* Weedkillers, black currants.

Copper–

analysis — *see under* Analysis, spectrographic.

colloidal — *see under* Bacterial canker, cherries, field trials.

damage — *see also under* Leaf fall, cherries; Spray damage investigations, apples.
notes on seasonal changes in susceptibility to damage by copper sulphate solution of leaves of M.II rootstocks, **1954**, II, 31, 41; **1955**, II, 35, 47; **1957**, II, 33; **1958**, II, 17. On M.II Cox and Worcester were equally susceptible, but on M.IV susceptibility of both increased, Cox more so than Worcester, **1955**, II, 35. No effect of rootstock on response to copper sulphate of various scion varieties, **1956**, II, 20. Influence of temperature and concentration on rate of entry into detached leaves, **1956**, II, 37. **Measurements of experimentally induced copper damage in apple leaves,** by F. W. M. Llewelyn; includes details of relationship between the damage done and the concentration of copper sulphate solution applied, **1956**, III, 109. Chelating agents ineffective in reducing leaf scorch, **1957**, II, 16. Rewetting of leaves increases amount of copper that can be taken up from copper sulphate deposits, **1957**, II, 33.

deficiency — *see under* Mineral deficiencies, copper.

oxychloride — *see under* Bacterial canker, cherries, field trials; Collar rot, apples; Gloeosporium rots, sprays/dips.

spraying — *see under* Bacterial canker, cherries, field trials; Gloeosporium rots, sprays/dips; Spray damage investigations, apples.

sulphate — *see under* Biennial bearing, defoliation trials; Collar rot, apples; Copper damage.

Core flush — *see under* Functional disorders, core flush.

Cork — *see under* Frost damage investigations, apples, symptoms of damage; Skin finish, apples.

Corn crops and trials — Experimental Farm; acreage, cropping, and general notes on barley, oats, and wheat, **1954**, I, 18; **1955**, I, 21; **1956**, I, 6; **1957**, I, 3; **1958**, I, 5; **1959**, I, 4; **1960**, I, 4; **1961**, I, 4.

Corynebacterium fascians — *see under* Cauliflower disease, strawberries.

Cotoneaster spp. — *see under* Fire-blight disease of pear, general.

Cotton seed oil — *see under* Bacterial canker, cherries, field trials (**1958**, III, 93); Leaf fall, cherries.

Couch grass — *see under* Weedkillers, top fruit.

o–Coumaric acid — *see under* Apple scab, field trials; — —, host-parasite relations; Silver leaf, plums, host-parasite relations.

Cover cropping — *see under* Soil management.

Coxcomb prominent (*Lophopteryx capucina*) — observations on, **1957**, III, 133.

CPBS (Fenson) — *see under* Acaricides.

CPCBS (Chlorfenson) — *see under* Acaricides.

Crag Herbicide — *see under* Weedkillers, strawberries.

Crataegus spp. — *see under* Fire-blight disease of pear, general.

Crinkle virus — *see under* Strawberries, virus diseases, virus vector studies; Virus diseases, heat treatment, strawberries.

Crotch angles, control of — *see under* Tree shaping, cherries; — —, plums.

Crotothane — *see under* Dinocap.

Culture techniques–

Erwinia amylovora — *see under* Fire-blight disease of pear, culture techniques.

Pseudomonas mors-prunorum — *see under* Bacterial canker, cherries, culture techniques.

Venturia spp. — *see under* Apple scab, culture techniques.

Cuprous oxide — *see under* Spraying programme.

Currant(s)–

black — *see under* Black currant(s).

breeding — *see under* Breeding, soft fruits.

red — *see under* Genetical studies, general.

Cuscuta sp. — *see under* Nettlehead, hops, virus vector studies.

Cuticle — *see under* Plant cuticle.

Cutin — notes on, **1960**, III, 41, 42.

Cydia pomonella — *see under* Codling moth.

Cydonia spp. — *see under* Fire-blight disease of pear, general; Virus diseases, indicator plants, apples.

Cyprex — *see under* Dodine acetate.

Cytology — *see under* Genetical studies, cytology.

Dagger nematodes — *see under* Eelworms, soil migratory, virus vector studies.

Dalapon — *see under* Weedkillers, top fruit.

Damson-hop aphid (*Phorodon humuli*) — *see under* Hop mosaic, virus vector studies.

Daniels' September — *see under* Black currants, variegation.

Dasyneura sp. — *see under* Leaf-curling midge.

,, *pyri* — *see under* Pear leaf midge.

,, *tetensi* — *see under* Black currant leaf midge.

DDT — *see also under* Beneficial insects and mites, predators, fruit tree red spider mite; Harvest residues, apples; Insect fauna; Insecticide persistence, DDT; Spraying programme; and under the common name of the insect to be controlled.
Some observations on the effects of formulation on the persistence of DDT and its toxicity to certain orchard insects and mites, by R. P. Tew and Joan R. Groves; little evidence of differential effects due to the mode of formulation of the insecticide, **1956**, III, 152. Wettable powders of DDT more toxic to insects that do not eat the leaves (e.g. mirids) than equivalent deposits from emulsions, **1957**, II, 30, 32.

Deblossoming–

apples — *see also under* Biennial bearing, deblossoming trials; Carbohydrate resources; Histological investigations, apple rootstocks.
effect of deblossoming on four commercial scion varieties on M.IX and M.XVI; deblossoming of trees on M.IX caused an average girth increase of 18%, **1958**, II, 15. Cox trees deblossomed in previous years carried 40 fruits to maturity from every 100 blossom trusses, compared with 8 on trees which had cropped each year, **1959**, II, 15.
In pruning trial, the *first* crop from the regulated and renewal-pruned trees that were completely deblossomed for the first six years almost equalled the *accumulated* crop from normally treated trees; the subsequent crops of the deblossomed trees were heavier, probably due to their larger size, **1959**, IV, 126.

strawberries — notes on, **1956**, IV, 174.

Defender — *see under* Verticillium wilt, hops, tolerant varieties.

Deficiencies, mineral — *see under* Mineral deficiencies.

Defoliating sprays — *see under* Biennial bearing, defoliation trials.

Defoliation (premature) — *see under* Leaf fall.

,, (treatment)– — *see also under* Biennial bearing, defoliation trials; Bud development; Carbohydrate resources; Growth analysis, shoots and stems; Histological investigations, apple rootstocks; Tree shaping, plums.

apples — removing the spur leaves at green cluster and pink bud had little effect on Laxton's Superb, but decreased the crop of Worcester by 65% and of Cox by 82%, **1961**, II, 18.

Degeneration virus of loganberries — *see under* Loganberries, virus diseases.

Delayed open-centre method — *see under* Tree shaping, apples.

Demeton-methyl (Metasystox) — *see under* Spraying programme; and the common name of the insect to be controlled.

Dendromyza cerasiferae — *see under* Cambium miner.

Density — *see under* Verticillium wilt, hops, tolerant varieties.

Depressaria aranella — a small Tineid; observations on, **1957**, III, 133.

Derris — *see under* Raspberry beetle.

2,4-DES — *see under* Weedkillers, strawberries.

Design, experimental — *see under* Statistical studies, experimental design.

Diazinon — *see under* Codling moth, insecticide trials.

Dieback–

apples — *see under* Apple canker; Apples, dieback.

black currants — *see under* Black currant dieback.

cherries — *see under* Bacterial canker, cherries; Cherry leaf roll.

pears — *see under* Blossom wilt, pears; Fire-blight disease of pears, general.

plums — *see under* Bacterial canker, plums.

raspberries — *see under* Raspberry dieback.

Dieldrin — *see under* Codling moth, insecticide trials; Ground beetles, strawberries; Harvest residues, strawberries, dieldrin; Insecticide persistence, dieldrin.

Diesel oil — *see under* Weedkillers, top fruit.

Dimethoate (Rogor) — *see under* Apple-grass aphid; Apple sawfly; Apple sucker; Fruit tree red spider mite, field trials; Raspberry beetle; Rosy apple aphid; Woolly aphid, control.

Dinocap (DNOPC;—Crotothane, Karathane) — *see under* Apple mildew, field trials; — —, general; Beneficial insects and mites, predators, fruit tree red spider mite; Codling moth, insecticide trials; Fungicide testing, powdery mildews, Spray damage investigations, apples; — — —, gooseberries; Spraying programme; Strawberry powdery mildew.

Dinoseb (DNBP) — *see under* Weedkillers, strawberries.

Diquat — *see under* Weedkillers, top fruit.

Disbudding — *see under* Propagation, sphaeroblast shoots.

Disc cuttings, strawberries — *see under* Propagation, strawberries.

Ditton Fields, history of — *see under* History of Research Station land (**1954**, III, 55).

,, Laboratory — *see under* Fruit storage investigations in collaboration with the Ditton Laboratory.

Ditylenchus dipsaci — *see under* Eelworms, stem and bulb.

DNOC (DNC) — *see under* Apple mildew, field trials; Biennial bearing, deblossoming trials.

DNOP — *see under* Fungicide testing, powdery mildews.

DNOPC — *see under* Dinocap.

Dock sawfly (*Ametastegia glabrata*) — observations on, **1954**, III, 134; **1956**, III, 132.

Dodder — *see under* Nettlehead, hops, virus vector studies.

Dodine acetate — *see under* Apple scab, field trials; Beneficial insects and mites, predators, fruit tree red spider mite.

Dotted border moth (*Erannis progemmaria*) — notes on, **1955**, III, 143.

Double-working–

double-shield budding–

apricot/plum — notes on, **1955**, II, 25.

pear/quince — notes on, **1954**, II, 21. In 10-year-old trial of double-worked Williams' Bon Chrétien on quince, trees with intermediates of Beurré Hardy or Fertility were superior to those with Beurré d'Amanlis or Hessle, **1955**, II, 25. Double-shield budding carried out on a commercial scale in the experimental nurseries for the first time; a 91% 'take' was achieved, **1953**, I, 6.

interstocks–

apple — trial planted to assess the effects of various interstocks, in 2 in. and 14 in. lengths, with Cox as the scion and M.II the rootstock, **1960**, II, 7.

cherry — notes on, **1956**, II, 11; **1961**, II, 8.

Drosophila melanogaster — *see under* Fruit fly.

Drought — *see under* Irrigation; Leaf fall, apples; Mineral composition, apple plants; Soil management, apples, grass sward; Soil moisture studies.

Dustywings — *see under* Lacewings.

Early Prolific — *see under* Nettlehead, hops, general; Virus diseases, indicator plants, hops.

Earwig — *see under* Common earwig.

East Malling Research Station–

historical studies — *see under* History of Research Station land.

soil surveys — *see under* Soil surveys.

Eelworms–

leaf and bud (*Aphelenchoides* spp.) — *see also under* Cauliflower disease of strawberries.
notes on, **1956**, II, 33. Rapid decline in persistence of *Aphelenchoides ritzema-bosi* in inoculated soil within a few months, **1954**, II, 39; **1955**, II, 45. Infestation of strawberry plants by *A. ritzema-bosi* and *A. fragariae* can be substantially reduced, but not eliminated, by organophosphorus compounds; pre-planting dips more effective than post-planting sprays, **1955**, II, 45. In field experiment on infestation of strawberry plants by *A. ritzema-bosi*, artificial inocula became ineffective within 2-3 months, **1957**, II, 31, and owing to slow infestation from natural sources, plants set in uninoculated soil 4½ years ago now as heavily infested as those set in inoculated soil, **1958**, II, 33.

root lesion — *see under* Eelworms, soil migratory.

soil migratory–

general — notes on, **1954**, II, 39. Marked increase in root and shoot growth of apple seedlings in pots following removal of the root lesion eelworms from the soil; in similar field trial with strawberries, slight increase in vigour resulted, **1955**, II, 45. Associated with (i) a slow decline of apple, (ii) a replanting problem in cherry, and (iii) poor root growth and decline of strawberries, **1956**, II, 33. Strawberries failing and dying in patches in a light sandy soil found to be heavily attacked by *Pratylenchus penetrans*; soil round black currant stock plants showing a marked reduction of fine roots contained very high populations of two species of *Rotylenchus*. No causal relationships established, **1958**, II, 33.

heat treatment — notes on, **1959**, II, 32. Moderate heat treatment (60° C for 30-40 min.) of soil from a declining apple orchard, as well as one containing few eelworms, resulted in improved growth of apple plants, **1957**, II, 31.
In trial comparing effect of heat treatment of old apple soils and soils not previously planted with apples, growth of apples was greatly improved in the former, but not in the others, **1958**, II, 33.

host-parasite relations — notes on experiments with apple seedlings in pots, with special reference to the replant problem, **1959**, II, 32; **1960**, II, 33; **1961**, II, 34.

soil fumigation — in trials on strawberry beds infested with *Pratylenchus penetrans*, a mixture of dichloropropane and dichloropropene was effective in improving the growth of Royal Sovereign plants and reducing the eelworm population, **1959**, II, 32; **1960**, II, 33.

virus vector studies — *Xiphinema* sp. found in soil round roots of strawberries infected with raspberry yellow dwarf (arabis mosaic) virus, **1958**, II, 33, identified as *X. diversicaudatum* and confirmed as the vector, **1959**, II, 27. Arabis mosaic virus was transmitted to petunia seedlings by *X. diversicaudatum* after minimum acquisition and test feeding periods of one and three days respectively; the nematodes remained infective after periods up to 30 days without access to plants, **1960**, II, 29.
Surveys of distribution of *Xiphinema diversicaudatum* and *Longidorus* sp., **1959**, II, 32, showed that *X. diversicaudatum* is usually absent, or present only in very low numbers, in cultivated and pasture land, though moderate numbers occur consistently in the neighbouring hedgerows and woodlands; occasionally, quite high populations occur under suitable cultivated hosts such as strawberry, **1960**, II, 33; occurrence of these eelworms not strongly

Eelworms–soil migratory–virus vector studies–*continued*

correlated with incidence of nettlehead or cherry leaf roll virus, **1961**, II, 34.

stem and bulb — infestation of strawberry plants with the stem and bulb eelworm (*Ditylenchus dipsaci*) can be substantially reduced by organophosphorus compounds; pre-planting dips better than post-planting sprays, **1955**, II, 45.

Empria tridens — *see under* Raspberry sawfly.

Endogone sp. — *see under* Mycorrhiza.

Endomychus coccineus — a fungus-feeding beetle; larvae observed feeding on the fructifications of the silver leaf fungus, **1957**, III, 133.

Endothal — *see under* Biennial bearing, deblossoming trials.

Endrin — *see under* Apple sawfly; Black currant gall mite; Harvest residues, black currants; Spraying, pre-blossom.

Enterprise — *see under* Raspberry tasting trials; Raspberry varieties.

Entomology Section — general review of research work, **1954**, II, 38; **1955**, II, 44; **1956**, II, 31; **1957**, II, 28; **1958**, II, 31; **1959**, II, 30; **1960**, II, 31; **1961**, II, 32.

Eotetranychus carpini — description and life history, **1955**, III, 136.

Epinasty virus — *see under* Rootstocks, apple, virus infection.

Epsom salt — *see under* Apple mildew, in relation to magnesium nutrition; Magnesium, leaf intake; Mineral deficiencies, magnesium.

Erannis aurantiaria — *see under* Scarce umber moth.

,, *defolaria* — *see under* Mottled umber moth

,, *progemmaria* — *see under* Dotted border moth.

Eriophyes ribis — *see under* Black currant gall mite.

Eriophyid mites — *see under* Hop mosaic, virus vector studies.

Eriosoma lanigerum — *see under* Woolly aphid.

Ernarmonia formosana — *see under* Cherry-bark tortrix moth.

,, *pomonella* — *see under* Codling moth.

Erwinia amylovora — *see under* Fire-blight disease of pear.

Erythroneura alneti — *see under* Leafhoppers, on apples.

Established-spur pruning — *see under* Pruning, apples, established-spur system.

European rusty mottle — *see also under* Cherries, virus diseases.
European rusty mottle disease of sweet cherry, by A. F. Posnette and R. Cropley; rust-coloured pigmentation of leaves in late summer is a characteristic feature which distinguishes it from the mild rusty mottle disease of N. America, **1960**, III, 85.

Euscelis spp. — *see under* Green petal virus, virus vector studies; Nettlehead, hops, virus vector studies.

Experimental design — *see under* Field experimentation; Statistical studies, Experimental design.

,, Farm — *see under* Farm, Experimental, reports.

,, glasshouses — *see under* Glasshouses, Experimental Farm.

,, nurseries — *see under* Nurseries and stoolbeds, Experimental Farm.

,, plantations — *see under* Farm, Experimental, reports.

Exploit — *see under* Raspberries, Exploit.

F 12/1 — *see under* Rootstocks, cherry.

Farm, Experimental, reports — **1954**, I, 15; **1955**, I, 17; **1956**, I, 3; **1957**, I, 1; **1958**, I, 1; **1959**, I, 1; **1960**, I, 1; **1961**, I, 1.

Fat hen — *see under* Verticillium wilt, hops, weed hosts; Weedkillers, strawberries.

Fauna, orchard — *see under* Insect fauna.

Fenson (CPBS) — *see under* Acaricides.

Feronia melanaria — *see under* Ground beetles, strawberries.

Fertilizers — *see under* Manuring.

Field experimentation — *see also under* Statistical studies, experimental design.
Practical aspects of field experimentation with fruit, by T. N. Hoblyn, **1957**, III, 43.

Filler trees — *see under* Tree density, apples.

Fire-blight disease of pear (*Erwinia amylovora*)–

culture techniques — notes on, **1960**, II, 24.

general — **Fire-blight disease of pear**, by J. E. Crosse, Margery Bennett and Constance M. E. Garrett; this disease, which was first observed in Kentish orchards in 1957, is fully described with details of its disease cycle, **1958**, IV, 151. Inoculations with different strains showed Laxton's Superb to be more susceptible than Williams' or Conference; various apple varieties also affected. Pathogenic to *Crataegus*, *Amelanchier*, *Chaenomeles*, *Cotoneaster*, *Cydonia*, *Pyracantha* and *Sorbus* spp., **1959**, II, 23.

Flame photometer — *see under* Analysis, spectrographic.

Flat scarlet mite (*Brevipalpus geisenheyneri*) — description and life history, **1955**, III, 136.

Flesh breakdown, apples — *see under* Functional disorders, internal breakdown; — —, low temperature breakdown.

Fluoroacetamide — *see under* Black currant gall mite; Spray damage investigations, black currants.

Foliar spraying (other than for pests and diseases) — *see under* Mineral nutrition, nutrient spraying.

Forficula auricularia — *see under* Common earwig.

Fragaria vesca — *see under* Virus diseases, indicator plants, strawberries; Virus testing, strawberries.

Frameworking, cherries — *see under* Tree form, cherries.

France — **Fruit growing and frost protection in France and the Rhineland**, by Irena Modlibowska, J. MacCormick and C. H. W. Slater, **1961**, IV, 128.

Froghoppers — *see under* Nettlehead, hops, virus vector studies.

Frost–

atmospheric conditions influencing incidence — **Meteorological factors in the growth of plants**, by Sir David Brunt; cloudless skies, absence of wind, and low vapour pressure in the atmosphere are predisposing factors, **1958**, III, 41.

soil conditions influencing incidence — **The effect of soil compaction on incidence of frost**, by C. H. W. Slater and J. P. Ruxton; minimum air temperature immediately above uncultivated or compacted soil is higher than that over cultivated or loose soil, **1954**, III, 88. Air temperature over wet soil is slightly higher than over dry soil, **1957**, II, 10. **Meteorological factors in the growth of plants**, by Sir David Brunt; air temperature over grass and clover sward may be 6° F lower than over bare soil, **1958**, III, 41.

Frost damage investigations– *see also under* Frost protection.
notes on, **1954**, II, 25; **1955**, II, 29; **1956**, II, 14; **1957**, II, 10; **1958**, II, 11; **1959**, II, 10; **1960**, II, 11; **1961**, II, 11.

apples–

frost resistance *see also under* Breeding, top fruits, apples, late flowering.
notes on, **1954**, II, 25; **1955**, II, 29; **1956**, II, 14; **1957**, II, 10; **1958**, II, 11; **1959**, II, 10.

parthenocarpic fruit a growth substance applied to apple blossom gave seedless fruits of varying size according to the concentration used, **1959**, II, 10.

symptoms of damage vertical splits caused on the S.W. side of some trees, but the bark was not lifted from the wood, **1954**, II, 25. Frost rings in trunks of grubbed trees caused by severe winters, **1956**, II, 14. Most varieties showed heavy russeting with cracks round the pedicel, frosted cheek, frost rings, or green blotches round the eye; severe cork formation in Tydeman's Late Orange, **1957**, II, 10.

water sprinkling range of sprinklers, controlled by a thermostat, installed on the frost plot; absence of frost blemishes on sprinkled fruit, **1956**, II, 14. Sprinkled trees carried a full crop, unsprinkled ones practically nothing, **1957**, II, 10. Sprinkler operating at 29° F used 60% less water than one operating at 32° F; both effective in protecting James Grieve against damage, **1959**, II, 11. Sprinkling effective in preventing internal damage to fruitlets from the exceptionally late frost on 27th/28th May, **1961**, II, 12.

apricots notes on, **1954**, II, 25.

black currants–

frost resistance Amos Black more resistant than 7 other varieties; tying up bushes greatly reduced damage inside the bushes, but the ties must be released before the leaves have grown much, **1960**, II, 11.

water sprinkling notes on, **1961**, II, 12. In autumn, using gibberellic acid to break rest period, **1959**, II, 10; flowering bushes in pots, exposed to a temperature of 22° F, effectively protected by precipitation rates of 4-5 mm/hr, **1960**, II, 11.

cherries notes on, **1961**, II, 12. Noir de Guben only variety to be damaged, **1960**, II, 11.

loganberries thornless type slightly less damaged by severe frosts in early February, **1954**, II, 25. Some primary buds killed by frost at bud-break, but secondary buds developed into fruiting laterals which bore a satisfactory crop, **1958**, II, 10. Relative resistance of various new clones, **1959**, III, 50.

peaches notes on, **1961**, II, 12. Bush trees suffered severely from hard winter frosts, but wall-trained trees had good crops, **1956**, II, 14.

pears– frost a major factor in the irregular cropping of pears, **1958**, IV, 143. Dr. Jules Guyot the worst affected variety, **1959**, II, 10.

parthenocarpic fruit Durondeau had 98% of the flower buds damaged, but nevertheless produced a small crop with over 90% of seedless fruits of good size, **1954**, II, 25. **Stimulation of fruit development in frost damaged pears**, by Irena Modlibowska; effects of gibberellic acid and 2,4,5-TP investigated. GA at 50 p.p.m., applied one day after the frost, resulted in a bumper crop of good-sized seedless fruits on Conference; applied to decapitated white buds of Conference and Laxton's Superb one day after frost, it caused them to set a heavy crop of marketable seedless fruits. Treatments may have commercial possibilities, **1960**, III, 46. Treatment with GA following frosts resulted in the production of seedless fruits of full size, particularly with Packham's Triumph, **1961**, II, 12.

Frost damage investigations–*continued*

plums — notes on, **1961**, II, 12.

raspberries — notes on, **1955**, II, 29.

research equipment — **Frost damage research equipment at East Malling,** by C. H. W. Slater, **1956**, III, 93.

strawberries– — notes on, **1957**, II, 9; **1959**, II, 10.

protective measures — trials with various materials to cover plants at night; sisalkraft paper satisfactory if covered with aluminium foil either on both sides or on the upper side only, **1957**, II, 10.

water sprinkling — *see under* Frost damage investigations, apples, water sprinkling; — — —, black currants, water sprinkling; Frost protection.

,, protection — *see also under* Frost damage investigations.
Fruit growing and frost protection in France and the Rhineland, by Irena Modlibowska, J. MacCormick and C. H. W. Slater; discusses use of oil heaters, water sprinkling, wind machines and artificial fogs, **1961**, IV, 128.

Fruit abscission — *see under* Fruit drop.

,, analysis — *see under* Analysis, chemical, organic, apple fruits.

,, bud development — *see under* Biennial bearing, defoliation trials.

,, colour, apples — *see also under* Farm, Experimental, reports; Gloeosporium rots, orchard factors, fruit colour.
fruit of Laxton's Superb trees in dry soil (covered with polythene) had much better colour than that from trees receiving the season's rainfall, **1955**, II, 26. In fruit thinning trial with Duchess Favourite, heavy thinning led to improved fruit colour, **1955**, IV, 157. In manurial trial with Cox on M.XII, fruit colour was better on the grass plots, even where nitrogen is added, than on the plots still under clean cultivation, **1957**, II, 18. Comparative colour grades of fruit in the MM. rootstock trials, **1958**, III, 50.

,, cracking — *see under* Frost damage investigations, apples, symptoms of damage; Fruit splitting; Skin finish, apples; Spray damage investigations.

,, crops, progress in research — *see under* Bulletins on progress in research, fruit crops.

,, development–

apples — *see under* Analysis, chemical, organic, apple fruits; Histological investigations, apple fruits.

pears — *see under* Frost damage investigations, pears, parthenocarpic fruit.

,, drop– — *see also under* Spray damage investigations.

apples — *see also under* Biennial bearing, defoliation trials, by hand; Mineral deficiencies, magnesium; Mineral nutrition, nitrogen.
Studies on control of apple sawfly, *Hoplocampa testudinea* (Klug). II. Effect of sprays on fruit drop and yield, by H. W. Barlow, G. H. L. Dicker and J. B. Briggs; effects of parathion, nicotine and BHC compared; only parathion had a marked effect on fruit drop, varying with dates of application, **1954**, III, 107. When trees of Laxton's Superb were droughted by covering the soil with polythene, heavy fruitlet drop early in the season was induced, **1955**, II, 26. 'June' drop increased with harder pruning, **1959**, IV, 123. Spraying with 2½% lime-sulphur at green cluster and pink bud increased early fruit drop of Cox and Worcester, but this was compensated for by reduced drop later in the season; yield of Cox was not affected, but that of Worcester was increased by 20%, **1961**, II, 18.

pears — pear sucker a potential cause of fruit drop, **1958**, IV, 146.

Fruit fly (*Drosophila melanogaster*) — *see also under* Insect rearing.
used in bio-assay technique for measuring harvest residues of dieldrin and endrin, **1958**, II, 35, other insecticides, **1959**, II, 34, and aldrin, **1960**, II, 35.

,, growing — **Some impressions of apple orchard practices in Canada,** by G. H. L. Dicker and A. H. M. Kirby, **1954**, IV, 160. **Fruit growing in Australia and New Zealand. Some impressions gained during a study tour in 1959**, by W. S. Rogers, **1959**, IV, 118. **Fruit growing in Northern Italy**, by A. P. Preston, **1960**, IV, 123. **Fruit growing and frost protection in France and the Rhineland**, by Irena Modlibowska, J. MacCormick and C. H. W. Slater, **1961**, IV, 128.

Fruitlet mining tortrix (*Pammene rhediella*) — controlled by DDT at petal-fall, **1961**, IV, 119.

Fruit marketing — *see under* Marketing, fruit.

,, nutrition — *see under* Mineral nutrition.

,, Nutrition Section — general review of research work, **1956**, II, 22; **1957**, II, 18; **1958**, II, 20; **1959**, II, 18; **1960**, II, 20; **1961**, II, 20.

,, quality — *see under* Farm, Experimental, reports; Fruit colour, apples; Fruit storage investigations; Marketing, fruit; Skin finish.

,, russeting — *see under* Frost damage investigations, apples, symptoms of damage; Skin finish, apples; Spray damage investigations.

,, set– — *see also under* Farm, Experimental, reports.

apples — *see also under* Mineral deficiencies, magnesium; Mineral nutrition, nitrogen; Spray damage investigations, apples.
in fruit thinning trial with Duchess Favourite on M.IX, thinning one fruit to twenty leaves gave the best set of fruit, **1955**, IV, 157. Several growth substances, including gibberellic acid, had no effect on setting of Cox, **1959**, II, 7. In pruning trials, fruit set *and* 'June' drop increased with harder pruning, **1959**, IV, 123.

apple-pear hybrids — good setting obtained with use of naphthoxy-acetic acid, **1954**, II, 23.

black currants — in variety trial, Boskoop Giant set lowest proportion of berries, Mendip Cross and Seabrook's Black highest, **1954**, III, 78.

pears — *see also under* Spray damage investigations, pears.
Irregular cropping of pears, by W. S. Rogers and G. A. Booth; fruit set influenced by climatic conditions, pollinators, 'blossom condition', spray damage, and scion rooting, **1958**, IV, 143.

parthenocarpic fruit — *see under* Frost damage investigations, parthenocarpic fruit.

,, size– — *see also under* Farm, Experimental, reports.

apples — *see also under* Biennial bearing, deblossoming trials; Fruit thinning, apples; Functional disorders, bitter pit; Gloeosporium rots, orchard factors, fruit size; Histological investigations, apple fruits; Irrigation, apples; Soil moisture studies.
study begun of fruit size in relation to leaf area and number, with a wide range of rootstocks, **1958**, III, 7. In trial with M. and MM. rootstocks on two soil types, size of fruit was greater on the loam than on the sand, but differences between rootstocks were small, **1958**, III, 49. With Cox, no effect of different pruning methods on fruit size, but with Superb, fruit size from established-spur pruned trees was consistently largest; with Superb and Worcester the regulated trees gave the smallest fruits, **1959**, IV, 124.

Fruit size–*continued*

black currants — *see under* Black currants, vein pattern virus; — —, yellows virus; Breeding, soft fruits (**1957**, III, 65); Pruning, black currants.

raspberries — *see under* Irrigation, raspberries.

,, splitting– — *see also under* Farm, Experimental, reports.

apples — *see under* Frost damage investigations, apples, symptoms of damage; Skin finish, apples; Spray damage investigations, apples.

cherries — trial with 1, 2, and 3 applications of NAA at 1 p.p.m.; incidence of splitting only very slightly reduced, **1955,** II, 35. No evidence that NAA effective, **1956**, II, 20.

plums — inconclusive results with NAA, **1956**, II, 20.

,, storage investigations — in collaboration with the Ditton Laboratory.
see also under Functional disorders; Gloeosporium rots; Histological investigations, apple fruits.
general review of research work, **1954**, II, 45; **1955**, II, 51; **1956**, II, 39; **1957**, II, 35; **1958**, II, 39; **1959**, II, 37; **1960**, II, 38; **1961**, II, 38.

,, tasting — *see under* Tasting, fruit

,, thinning, apples — *see also under* Biennial bearing, fruit thinning trials; Farm, Experimental, reports; Gloeosporium rots, orchard factors, fruit thinning. **Thinning apples by the leaf-count method**, by A. P. Preston; results summarized of a nine-year fruit thinning trial with Duchess Favourite, with three degrees of thinning, early and late, **1955**, IV, 157. Trial with Sunset started with two degrees of hand thinning, at 10, 20, and 30 days after full bloom, **1954**, II, 23, 31; marked effect of early thinning on size of fruits, **1955**, II, 34; **1958**, II, 17; **1959**, II, 15, as well as maturity, **1955**, II, 34, and length of extension shoots, **1959**, II, 15; **1960**, II, 16. Evident from pruning trials that fruit thinning is more important with the lighter pruning methods, especially in years of heavy fruit set, **1959**, II, 7. Sprays such as NAA plus glycerine, and naphthalene acetamide, applied only to the tops of the trees, successful in some parts of Australia and New Zealand, **1959**, IV, 120. Fruit thinning treatments superimposed on the 15-year-old pruning trial with Worcester and Laxton's Superb, **1960**, II, 9. In preliminary trial with Sevin as a thinning agent, a clear response was shown by Worcester, **1961**, II, 9.

,, tree red spider mite (*Metatetranychus ulmi*)– — *see also under* Acaricides, persistence; Beneficial insects and mites, predators, fruit tree red spider mite; Farm, Experimental, reports; Insect catching/counting; Insect fauna; Insect rearing; Skin finish, apples, effect of sprays; Spraying programme; Statistical studies, fruit tree red spider mite.

effect on tree growth — net CO_2 uptake of bronzed leaves reduced, **1959**, II, 15. Rate of growth of potted Brompton cuttings inoculated early in June seriously reduced and the root system of infested plants only half the weight of the controls, **1960**, II, 15. **The vegetative growth of young plants of Brompton plum infested with fruit tree red spider mites**, by D. J. Avery; mites caused a large reduction in the rate of shoot growth, and affected the relative growth of all parts of the plants; increase in root growth of the mite-infested plants was only 44% of that of the controls, **1961**, III, 77.

field trials — in trial at the Essex Institute of Agriculture, Writtle, chlorfenson (CPCBS) applied twice in June at 0·025% gave satisfactory commercial control for the rest of the summer, **1954**, II, 43; **1955**, II, 48; one application at pink bud inadequate, **1955**, II, 48. In codling

Fruit tree red spider mite (*Metatetranychus ulmi*)–field trials–*continued*

moth trials DNOPC showed marked acaricidal action, **1955**, III, 146. **The fruit tree red spider mite, *Metatetranychus ulmi* (Koch): a further pilot trial in the field of two ovicides applied to apples at pink bud**, by R. P. Tew and R. G. Gambrill; both chlorfenson and chlorbenside were effective, but there were fewer summer eggs with the chlorbenside treatments, **1955**, III, 149. **The problem of acaricide-tolerant strains of the fruit tree red spider mite, *Metatetranychus ulmi* (Koch) in South-East England**, by Elsie Collyer and A. H. M. Kirby; evidence from the trial at Writtle, in which plots have been sprayed with chlorbenside since 1954, that by 1957 the mites had become tolerant of or resistant to this chemical; excellent control with amiton, sprayed once in mid-June, the leaves remaining highly toxic for at least thirteen weeks, **1958**, III, 131.
In new trial at Writtle, *one* application of Tedion, Kelthane, phenkapton, or dimethoate (Rogor), on 25th May, gave satisfactory commercial control up to the end of August, **1959**, II, 31, 34. Development of resistance being studied with continuing and alternating treatments, **1960**, II, 31, 35; satisfactory control for the third year, both with repeated treatments of the above chemicals, or where alternated with one of contrasting chemical structure, **1961**, II, 32, 35.
In small-scale trial, severe russeting and cracking of Cox resulted from a high-volume application of Kelthane at petal-fall, but not when made two weeks later, **1960**, II, 32; **1961**, II, 32.

general — observations on, **1954**, III, 136. Notes on life history and control, **1961**, IV, 119.

„ tree tortrix moth (*Archips podana*) — in field trials in Sussex DDT, azinphos-methyl (Gusathion) and Sevin, applied in mid-June, early and late July gave respectively 69, 97 and 90% reduction of fruit injury at harvest; in another trial, with azinphos-methyl only, the first two applications gave 92% control, **1960**, II, 31. Notes on life history and control, **1961**, IV, 120.

Functional disorders, apples–

bitter pit — incidence highest on established-spur pruned trees and least on regulated-pruned ones, **1955**, II, 51. Serious on light soils, especially where there was a light crop on young trees, and the fruits were large, **1958**, II, 39. Less bitter pit in fruit from grassed-down orchards, **1956**, II, 40, **1959**, II, 37. Evidence from irrigation trial at Luddington that all irrigation treatments increased the susceptibility of earlier picked fruit to bitter pit, **1960**, II, 38. Losses heavier where the average size of fruit in the sample was large, **1960**, II, 38; **1961**, II, 38.

core flush — very severe in fruit from trees under clean cultivation without phosphorus, or with potash, **1954**, II, 45. More prevalent in gas-stored samples than in cold-stored ones, **1957**, II, 35; **1961**, II, 38, and from trees grown in a grass sward and with applied potash; less in those with applied nitrogen or phosphate. Samples composed of large fruit most affected, **1961**, II, 38.

internal breakdown — in Cox stored at 32° F and 37° F incidence reduced by grass sward, and applied potash, **1955**, II, 51; **1956**, II, 39; **1957**, II, 35.

low temperature breakdown — in Cox stored at 32° F, markedly less in samples from trees grown in a grass sward and with applied potash, **1958**, II, 39; **1959**, II, 37; **1960**, II, 38; **1961**, II, 38. Fruit from established spur pruned trees was worse affected than that from renewal pruned trees, **1957**, II, 35. Incidence increased by applied nitrogen, **1959**, II, 37, except in clean cultivation, **1958**, II, 39; **1959**, II, 37. More severe in fruit

Functional disorders, apples–low temperature breakdown–*continued*
picked two weeks early than in late picked samples, **1958**, II, 39, even when stored for the same period of time, **1959**, II, 37. Samples composed of large fruit suffered most, **1960**, II, 38; **1961**, II, 38. Evidence from irrigation trial at Luddington that all irrigation treatments increased susceptibility of fruit to this trouble, **1960**, II, 38.

Fuggle — *see under* Virus diseases, indicator plants, hops.

Fungicide(s)– — *see also under* Spraying, concentrate; Spray damage investigations; and under the common name of the disease to be controlled.
notes on field and laboratory investigations, including references to many chemicals not specifically indexed, **1954**, II, 36, 41, 43; **1955**, II, 41, 47, 49; **1956**, II, 28, 36; **1957**, II, 26, 32; **1958**, II, 28, 36; **1959**, II, 26, 34; **1960**, II, 28, 37; **1961**, II, 29, 36.

analysis — notes on, **1958**, II, 35.

general — **The search for better fungicides**, by M. H. Moore, **1954**, IV, 152.

persistence — *see also under* Harvest residues, apples.
captan three to four times as persistent as DNOPC, **1958**, II, 37.

testing–

glass-slide method — using spores of *Venturia inaequalis* and *Botrytis cinerea*. Notes on, **1954**, II, 41; **1955**, II, 47; **1956**, II, 36; **1957**, II, 32; **1958**, II, 36; **1959**, II, 35; **1960**, II, 36. **Laboratory tests of the effects of fungicides on the spore-germination of *Botrytis cinerea* Pers. ex Fr.**, by E. L. Frick; captan and thiram were among the most effective, as well as being the most suitable for field application, **1954**, III, 149. **Glass-slide spore-germination tests with some oxidation products of nabam**, by A. H. M. Kirby and E. L. Frick; of the commercial products tested those that were apparently ethylene thiram monosulphide and polymers were at least as active as captan towards spores of *V. inaequalis*, but they were less toxic to *B. cinerea*; the disulphide was less active than the monosulphide, **1956**, III, 146.

powdery mildews — using M.III apple rootstocks and barley seedlings, in infection tower. Notes on, **1954**, II, 42; **1955**, II, 41, 48; **1956**, II, 37; **1959**, II, 35; **1960**, II, 36; **1961**, II, 36. DNOPC and lime-sulphur superior to any other materials so far tried for control of apple mildew, **1957**, II, 33. DNOP as effective as DNOPC, **1958**, II, 36; **1961**, II, 36.

toxicity (to predators) — *see under* Beneficial insects and mites, predators, fruit tree red spider mite.

Fusarium sambucinum — *see under* Hop canker.

Gale damage — *see under* Wind damage.

Gall mites — *see under* Mites, Phytoptid.

Gas storage — *see under* Functional disorders, core flush; Gloeosporium rots, storage conditions.

Genetical studies–

cytology — notes on, **1955**, II, 28. **Cytological notes**, by Elizabeth Keep, **1957**, III, 75.

general — **An early sport of a red currant**, by R. L. Knight and Elizabeth Keep; a branch on one of the bushes of a red currant seedling was markedly earlier in leafing out, flowering and fruiting than the rest of the bush; this branch must have arisen from a bud sport and is likely to have been caused by a single gene mutation, **1957**, III, 74. **The genetics of suckering and tip rooting in the raspberry**, by R. L. Knight and Elizabeth Keep; in crosses between the red rasp-

Genetical studies–general–*continued*

berry (*Rubus idaeus*) and the American black raspberry (*R. occidentalis*), tip rooting and suckering are controlled by two independent genes; the transfer of the appropriate gene from the black raspberry to the red enables the latter to be propagated by tip layering and by leaf-bud cuttings in addition to the usual method of using spawn shoots, **1959**, III, 57.

Germany — **Fruit growing and frost protection in France and the Rhineland**, by Irena Modlibowska, J. MacCormick and C. H. W. Slater, **1961**, IV, 128.

Ghost swift moth (*Hepialus humuli*) — observations on, **1955**, III, 131.

Gibberellic acid — *see under* Frost damage investigations, apples, parthenocarpic fruit; — — —, black currants, water sprinkling; — — —, pears, parthenocarpic fruit; Fruit set, apples; Tree shaping, cherries; — —, plums.

Girths, branch and trunk — *see under* Statistical studies.

Glasshouses, Experimental Farm– general review of work, **1954**, I, 19; **1955**, I, 32; **1956**, I, 7; **1957**, I, 3; **1958**, I, 5; **1959**, I, 5; **1960**, I, 5; **1961**, I, 5.

cultural treatments and techniques — notes on repotting techniques, **1954**, I, 19. **Some factors affecting the culture of apple trees in pots under glass,** by M. M. MacNeill; applications of dried blood resulted in marked improvement in leaf colour, and twice as much wood growth, **1954**, III, 92. Addition of lime to compost has beneficial effect on apple seedlings, but some stone fruit seedlings have a better leaf colour if lime omitted, **1955**, I, 22. Notes on damage to bark tissue of pear trees caused by forcing, **1956**, I, 7. Notes on mist propagation, **1957**, I, 4; **1958**, I, 5. Notes on use of various types of non-porous pots, **1959**, I, 5; **1960**, I, 5.

methods for controlling temperature and light — heat-absorbing glass, supported above the glass roofs, more effective than polythene (used similarly) in reducing temperature, **1956**, I, 7. Use of phosphor-bronze and P.V.C. gauze in air-outlets; the latter transmits more light and may be cleaned, **1957**, I, 4.
In glasshouse fitted with heat-absorbing glass, temperature was 7° F lower than one fitted with hinges at the eaves and additional side ventilators, and 12° F lower than an unshaded glasshouse with normal ventilators, **1958**, I, 6. Temperature reduced by 16° F by heat-absorbing glass on the roof and a fan drawing moistened air through the house; house with longest axis east–west up to 6° F cooler than a similar one with north–south axis, **1959**, I, 5. Temperature on sunny days can be maintained at approx. 7° F above the outside screen temperature by a fan drawing cool moistened air through the house, together with fabric blinds; with heat-absorbing glass on the roof instead of blinds, a temperature difference of 10° F was maintained, **1960**, I, 5.

Glass-slide method for testing fungicides — *see under* Fungicide testing, glass-slide method.

Gloeosporium album — *see under* Gloeosporium diseases.

Gloeosporium diseases (*G. album* and *G. perennans*)–

inoculation experiments — incidence of rots from *G. perennans* developing during storage increased with the concentration of inoculum, irrespective of the time of inoculation; with *G. album*, no rots developed during the same period, **1958**, II, 26.

Gloeosporium diseases (*G. album* and *G. perennans*)–*continued*

spore production — notes on, **1959**, II, 25; **1960**, II, 26. **The assessment of spore production by *Gloeosporium album* and its relation to fruit infection**, by R. T. Burchill and K. L. Edney; spores are dispersed throughout the year, with a maximum discharge in the autumn; the incidence of rotting in samples collected during the growing season and others infected artificially was determined by the maturity of the apples rather than by the quantity of the inoculum to which they were exposed, **1960**, III, 90. Sprays of 0·1% PMC applied before bud-burst in 1960 suppressed spore production during early summer, and during the critical July-September period, **1961**, II, 26.

spore traps — description of, **1960**, III, 90.

Gloeosporium perennans — *see under* Gloeosporium diseases; Gloeosporium rots.

„ *ribis* — *see under* Black currant leaf spot.

„ sp — *see under* Bud-rot disease of hazel.

Gloeosporium rots– — *see also under* Fruit storage investigations; Gloeosporium diseases; Histological investigations, apple fruits.

Cox strain trial — fruit from 3-year-old trees of Cox propagated from selected trees showed no differences in susceptibility to the disease, **1961**, II, 38.

locality factors, influence of — least wastage from rots in fruit from Norfolk and Suffolk, **1959**, II, 37; greatest in that from Essex and Kent, **1960**, II, 38. Low incidence of rots in samples from some localities probably due to low level of inoculum in the orchard, **1960**, II, 27.

orchard factors, influence of–

age of trees — less rotting in fruit from young trees, **1957**, II, 35; **1958**, II, 39; **1959**, II, 37; **1960**, II, 38; **1961**, II, 38.

fruit colour — well-coloured fruit from the manurial trial kept better than green-coloured samples, irrespective of treatment, **1954**, II, 45.

fruit size — losses heavier where the average size of fruit in the sample was large, **1956**, II, 40; **1957**, II, 35; **1959**, II, 38; **1960**, II, 38; **1961**, II, 38.

fruit thinning — notes on, **1956**, II, 39. With Sunset apples from a fruit thinning trial, early and severe thinning treatments produced very large fruits that kept badly, **1959**, II, 37.

manuring and soil management — *With Cox from the manurial trial* stored at 32° F and 37° F, increased rotting associated with applied nitrogen, or cultivation treatments, **1954**, II, 45; **1957**, II, 35; **1958**, II, 39; **1959**, II, 37; pronounced effect of grass sward continued, but not of nitrogen, **1960**, II, 38; **1961**, II, 38. Applied potash tended to *increase* rotting, **1954**, II, 45; **1955**, II, 51; **1957**, II, 35; **1959**, II, 37.
With Laxton's Superb from the soil management trial, grass sward greatly reduced rotting (compared with arable and straw mulch treatments), **1955**, II, 51; **1956**, II, 39; **1957**, II, 35; fruit from the straw mulch treatment had the most rotting, **1956**, II, 39.
With Cox from commercial orchards, increased rotting associated with *low* potash applications, and no difference between fruit from grass sward and arable orchards, **1957**, II, 35. High nitrogen applications and clean cultivation tended to increase rotting, **1958**, II, 39.

pruning — summer pruning increased rotting, **1955**, II, 52. Cox from established-spur pruned trees had less rots than those from renewal pruned or regulated trees, **1956**, II, 39; **1957**, II, 35; Laxton's Superb from renewal pruned trees had least rotting, **1956**, II, 39. Some evidence that the incidence of *G. perennans* can be reduced by cutting out cankered shoots and branches, **1958**, III, 140.

Gloeosporium rots–orchard factors, influence of–*continued*

soil type — light soils associated with increased rotting, **1957**, II, 35; **1958**, II, 39; **1959**, II, 37; **1960**, II, 38; **1961**, II, 38.

time of picking — Cox picked two weeks before the normal time had least rotting, but the most breakdown, **1958**, II, 39; **1959**, II, 37.

sprays/dips — two sprays of captan (0·1%) during August reduced percentage of rotted fruit from 21·4% to 9·7%; one spray was insufficient for commercial use, **1955**, II, 52. Cinnamic acid used as a spray in September or as a fruit dip after harvest reduced infection; captan in September was the more effective spray, **1958**, II, 29. Captan reduced rotting, both when applied in the late summer and also when used in the routine sprays against scab, **1958**, II, 39. **The timing of spray treatments for the control of storage rot of apple caused by *Gloeosporium* spp.**, by M. H. Moore and K. L. Edney; a single spray of captan in mid-September was effective in reducing rots, and additional sprays in July and August improved control; variation in control due to effect of rainfall before and after spraying, **1958**, III, 106. A single spray in September of copper oxychloride or of captan substantially reduced the amount of rotting compared with cinnamic acid, **1959**, II, 25. Sprays of 0·1% PMC applied before bud-burst in 1960 reduced storage rots recorded early in 1961 to 5% compared with 21% on fruit from the control trees, **1961**, II, 26.

storage conditions (used for commercial samples) — notes on, **1954**, II, 45; **1955**, II, 51; **1958**, II, 39; **1959**, II, 37; **1960**, II, 38; **1961**, II, 38. Gas storage (3% oxygen and 5% CO_2 at ±38–39° F), enabled the majority of the samples to be kept for one month longer than cold storage, **1956**, II, 40; at the end of that period they were in better condition, but losses from rots were higher, **1957**, II, 35. **Storage conditions in relation to *Gloeosporium* rots.** by H. B. S. Montgomery; in samples where *G. album* was predominant, wastage was lower after 18 weeks' gas storage than 14 weeks' cold storage; where *G. perennans* was predominant, rotting was greater after gas storage, **1958**. III, 140.

Glutamic acid — *see under* Apple scab, host-parasite relations (**1955**, II, 37).

Glycerol — *see under* Apple scab, field trials (**1959**, II, 27).

Goliath — *see under* Black currant reversion.

Gooseberry(ies)–

breeding — *see under* Breeding, soft fruits.

mildew (*Sphaerotheca mors-uvae*) — *see under* Spray damage investigations, gooseberries.

red spider mite (*Bryobia praetiosa*) — *see under* Mites, Bryobia mite strains.

sawfly — *see under* Common gooseberry sawfly.

spray damage — *see under* Spray damage investigations, gooseberries.

Grafting, cherries — *see under* Tree form, cherries.

Grass sward — *see under* Manuring, apples; Soil management, apples, grass sward; — —, cherries; Soil moisture studies; Soil properties.

Great East Plantation, history of — *see under* History of Research Station land (**1954**, III, 54).

Green apple aphid (*Aphis pomi*) — observations on, **1954**, III, 135; **1956**, III, 132.

,, blotch — *see under* Frost damage investigations, apples, symptoms of damage.

,, capsid — *see under* Common green capsid.

Greenhouse red spider mite — *see under* Red spider mite.

Green leaf weevils (*Phyllobius* spp.) — observations on, **1954,** III, 133.

,, mottle virus — *see under* Peach green mottle virus.

,, petal virus–

virus vector studies — notes on, **1957**, II, 25, 29; **1958**, II, 32; **1959**, II, 27, 32; **1961**, II, 30. Transmitted from strawberry to clover by the leafhopper *Euscelis lineolatus*, **1956**, II, 28, and by *Speudotettix subfusculus*, **1960**, II, 29. *Aphrodes bicinctus* can infect strawberry plants with the virus, and has been found breeding on strawberry plants in the field, **1958**, II, 28. *A. bicinctus* was able to transmit clover phyllody but not witches' broom, **1961**, II, 30.

,, pug moth (*Chloroclystis rectangulata*) — observations on, **1955**, III, 131.

Grey mould, strawberries — *see under* Strawberry grey mould.

Grid method — for measuring leaf areas; *see under* Leaf areas.

Griseofulvin — *see under* Apple mildew, field trials; Apple scab, field trials; Strawberry grey mould.

Ground beetles, strawberries — *see also under* Harvest residues, strawberries; Insecticide persistence, dieldrin.
trap trench containing a layer of sprayed straw failed to exclude beetles from strawberry beds, **1956**, II, 33. **Some experiments on control of ground beetle damage to strawberry**, by J. B. Briggs; damage caused by the strawberry seed beetle and *Feronia* spp. is described; 0·2% dieldrin emulsifiable liquid successfully controlled the damage, but led to undesirably high harvest residues, **1956**, III, 142. Aldrin dust, applied to the soil round strawberry plants immediately before blossom was ineffective, **1957**, II, 30. Aldrin applied pre-blossom left residues in the soil that were toxic to the beetles throughout the fruiting period, **1958**, II, 33. Adult beetles responsible for damage invade strawberry beds shortly before the fruits begin to ripen. Aldrin, applied as a spray to soil around the plants at 10 lb/acre just before the blossom period or at 5 lb/acre just before strawing, greatly reduced fruit injury, **1959**, II, 31; an application at 5 lb/acre just before strawing reduced the amount of damaged fruit by 69%, **1960**, II, 32, and had no effect on the flavour of processed fruits, **1961**, II, 33. **A comparison of pitfall trapping and soil sampling in assessing populations of two species of ground beetles (Col.: Carabidae)**, by J. B. Briggs, **1960**, III, 108.

Groundsel — *see under* Verticillium wilt, hops, weed hosts; Weedkillers, strawberries.

Growth– — *see also under* the individual treatments or subjects.

,, analysis– — *see also under* Fruit tree red spider mite, effect on tree growth; Growth substances.

leaves — **The effect of a summer gale on leaves of the apple rootstock Crab C**, by H. W. B. Barlow and C. R. Hancock; discusses growth rate of leaves throughout the season, in relation to temperature, **1957**, III, 96. Notes on the effect of temperature on the rate of leaf production, **1961**, II, 17.

pruning effect — effects of extreme pruning treatments on four commercial scion varieties on M.IX and M.XVI; at 5 years old, average girth of very lightly pruned trees on M.XVI was 9% greater than the heavily pruned trees, but with trees on M.IX pruning had only a slight effect, **1958**, II, 15. During the first year of an experiment to compare growth following pruning at different times, trees pruned

Growth analysis–pruning effect–*continued*

in June added nearly as much weight as those unpruned after planting, **1961**, II, 16. **Extreme pruning treatments on apple staddles**, by D. H. Maggs; the percentage of leaf in the annual increment increased with increasingly severe pruning, while that of new roots decreased; the percentage of total stem (new plus old stem thickening) did not change appreciably, **1961**, III, 81.

roots

Taper and secondary thickening in stems and roots of the apple, by R. C. Knight; new adventitious roots began to grow from the stem base shortly before bud development was apparent, and cambial activity in the old roots started as a wave proceeding from the old stem junction towards the root tips; the onset of cambial activity in the roots was not related to their depth nor to their positions relative to the branches, **1960**, III, 65.

shoots and stems

notes on, **1954**, II, 30; **1955**, II, 34; **1956**, II, 19; **1958**, II, 16. In experiments with M.IX, M.II, M.XVI and Crab C grown under various conditions, the more vigorous stocks had the higher net assimilation rates, **1954**, II, 30; **1955**, II, 33, but over short periods this may not apply, **1956**, II, 18. Notes on net assimilation rates, over fortnightly intervals, of Laxton's Superb on M.XXV, M.VII, and the dwarfing 3431, **1960**, II, 15. **Internode growth in stoolbed shoots of the apple rootstock Crab C,** by H. W. B. Barlow and C. R. Hancock; describes experiments on vegetative shoots in which various parts were excised to assess their influence on elongation of the internodes, **1955**, III, 89. **Seasonal fluctuations in stem growth in the apple rootstock Crab C**, by C. R. Hancock and H. W. B. Barlow; fluctuations in growth rate were largely due to variations in temperature and hours of daylight, but the final length which the internodes attained was not so closely correlated with temperature, and hours of daylight had almost no effect, **1957**, III, 91. **A comparison of the growth patterns of two apple rootstock varieties during their first year**, by D. H. Maggs; comparisons between rooted layers of M.II and M.XVI showed that M.II developed more stem and M.XVI more root for plants of the same weight, **1957**, III, 101. **The effect of the original situation of the scion on its subsequent growth**, by D. H. Maggs; differences in growth between two-bud grafts taken from five positions along the graft-stick were not as great as those which would be expected if the buds had been stimulated by pruning; differences in weight between treatments could be accounted for by differences in leaf area as early as 28th May, **1958**, III, 83. **Taper and secondary thickening in stems and roots of the apple**, by R. C. Knight; secondary thickening started below newly growing shoots and developed rapidly downwards until it reached ground level in May; subsequent development was very much slower and did not always reach the base of the stem underground, so that the normal taper towards the tip of the stem was reversed below ground level, **1960**, III, 65. Notes on experiment to assess the effect of stem length on shoot extension and trunk thickening, **1959**, II, 14; **1961**, II, 17.

stock-scion interaction

see also under Deblossoming, apples; Growth analysis, pruning effect.

notes on, **1954**, II, 30; **1955**, II, 33; **1956**, II, 18; **1957**, II, 14; **1958**, II, 15; **1959**, II, 14; **1960**, II, 15, 16; **1961**, II, 16, 17. Final sample recorded of seven-year-old trees made up of pairs of four rootstock varieties; heaviest tree weighed 38 lb dry (71 lb fresh) and comprised 70% stem, 24% root, and 6% leaves, **1957**, II, 14; great regularity of the pattern of distribution of each year's increment among the growth regions of the tree, despite large differences

Growth analysis—stock-scion interaction–*continued*

in growth and form of the various combinations of rootstock and scion, **1961**, II, 16.

general — **Water and plant growth**, by Prof. T. A. Bennet-Clark; Amos Memorial Lecture, **1954**, III, 47. **The place of plant physiology in fruit growing**, by Prof. F. G. Gregory; Amos Memorial Lecture, **1956**, III, 41. **Meteorological factors in the growth of plants**, by Sir David Brunt; Amos Memorial Lecture, **1958**, III, 41. **The occurrence of areas of poor growth in a fruit tree nursery**, by J. A. Thompson; poor growth of plants in nursery on those parts previously occupied by related species, **1958**, III, 80. **The efficient fruit tree**, by D. H. Maggs, **1959**, IV, 128. **The limit of plant productivity**, by Prof. G. E. Blackman; Amos Memorial Lecture, **1961**, III, 39.

,, measurement studies — *see under* Statistical studies.

,, substances — *see also under* Auxins; Coleoptile assay method; Gibberellic acid; Indolebutyric acid; Kinetin; Naphthalene acetamide; Naphthalene acetic acid; Phloridzin.
notes on, **1954**, II, 31; **1955**, II, 34; **1956**, II, 19; **1957**, II, 15; **1958**, II, 17; **1959**, II, 15; **1960**, II, 17. **Some observations on growth inhibitors extracted from woody shoots**, by H. W. B. Barlow, C. R. Hancock and H. J. Lacey; in tests with extracts of Myrobalan B and Crab C, the inhibiting effect was proportional to the log of the concentration, either alone or in the presence of IAA, **1954**, III, 115. Large extract of Myrobalan B layer-bed shoots prepared, from which a growth substance was obtained, **1956**, II, 19; **1957**, II, 15; separated into two growth promoting and one inhibiting fraction, **1958**, II, 17. Pieces of both stem and root bark of apples appear to be able to inactivate indoleacetic acid in solution, and different rootstocks differ in their ability to do so, **1957**, II, 6. Growth inhibitor found in apple root and shoot extracts identified as the glucoside phloridzin, **1960**, II, 17. **An artefact in a coleoptile straight growth assay method**, by H. W. B. Barlow, C. R. Hancock and H. J. Lacey, **1960**, III, 72.

Grubbing of plantations, Experimental Farm — notes on, **1954**, I, 17; **1955**, I, 19; **1956**, I, 4; **1957**, I, 2; **1958**, I, 3; **1959**, I, 2; **1960**, I, 3; **1961**, I, 3.

Gusathion (azinphos-methyl) — *see under* Codling moth, insecticide trials; Fruit tree tortrix moth; Woolly aphid, control.

Hail — *see under* Weather conditions.

,, damage — fruit from regulated trees of Cox least damaged by severe hailstorm on 6th August, that from established-spur pruned trees most damaged, **1959**, IV, 125.

Hale's Early peach — *see under* Incompatibility, peaches.

Hardwood cuttings — *see under* Propagation, black currants; —, rootstocks, hardwood cuttings; —, sphaeroblast shoots.

Harpalus rufipes — *see under* Ground beetles, strawberries.

Harvest residues– — *see also under* Insecticide persistence.

apples — fifty days after application of 0·005% PMC or lead arsenate, residues of mercury were nil and of lead 1·4 p.p.m., **1954**, II, 42. **Harvest residues of malathion on soft fruits and apples**, by R. P. Tew and Joan M. Sillibourne; application at rates recommended for control of codling moth unlikely to leave residues exceeding 0·5 p.p.m. on fruits picked one week later, **1960**, III, 116.

black currants — application of endrin at grape-stage led to harvest residues of less than 1 p.p.m.; believed that endrin on picked fruits is not present in the expressed juice, **1958**, II, 36.

Harvest residues–*continued*

loganberries — two malathion sprays, at 19 and 7 days before harvest, led to harvest residues of less than 0·5 p.p.m., **1960**, III, 118.

raspberries — spraying with malathion emulsion at up to 0·1% active ingredient a week before picking led to harvest residues of less than 1 p.p.m., **1958**, II, 36; **1960**, III, 118.

soft fruit — **Harvest residues of malathion on soft fruits and apples**, by R. P. Tew and Joan M. Sillibourne, **1960**, III, 116.

strawberries–

aldrin — 0·2% aldrin applied pre-blossom left no residues on the fruit, **1958**, II, 33, 36. Residues from 0·1% aldrin applied pre-strawing were less than 0·1 p.p.m., **1959**, II, 34; **1960**, II, 35.

dieldrin — post-blossom spraying caused minimum harvest residues of 0·5 to 1·0 p.p.m.; fruiting plants should not be sprayed with this insecticide, **1956**, II, 36; III, 144; **1957**, II, 32. Pre-blossom sprays led to very low residues in the first pick and none in the second, **1958**, II, 36.

malathion — fruiting plants, sprayed with 0·1% malathion on 30th June, had less than 1 p.p.m. one week later, **1960**, III, 119.

Hawthorn — successfully infected with the fire-blight disease of pear using isolates of *Erwinia amylovora* from Laxton's Superb pear, **1958**, IV, 154; **1959**, II, 23.

Hazel, bud-rot disease — *see under* Bud-rot disease of hazel.

Heating, for frost protection — *see under* Frost protection.

Heat treatment — *see under* Eelworms, soil migratory, heat treatment; Virus diseases, heat treatment.

Height of budding, apples — *see under* Propagation, apples, height of budding.

,, ,, working, plums — *see under* Propagation, plums, height of working.

Hepialus humuli — *see under* Ghost swift moth.

Herbicides — *see under* Weedkillers.

High working, cherries — *see under* Tree form, cherries.

,, ,, , plums — *see under* Stem-building, plums.

Histological investigations–

apple(s)–

fruits — *see also under* Skin finish, apples, general.
notes on fruit development of Cox, **1956**, II, 40; **1957**, II, 36; **1958**, II, 39; **1961**, II, 38. Cells slightly smaller in fruit from Cox trees in grass without nitrogen, **1955**, II, 51. Very severe blossom thinning increased the rate of cell division and cell extension in Miller's Seedling fruitlets, **1959**, II, 38; **1960**, II, 38. **Observations on cell size and number in relation to fruit size in apples**, by M. Patricia Denne; variations in fruit size within a Cox tree, and between trees carrying different numbers of apples, are related to both size and number of cells in the cortex, **1960**, III, 120.

leaves — notes on, **1957**, II, 6.

rootstocks–

general — effects of deblossoming, defoliation, and summer pruning on rootstock anatomy, **1955**, II, 24. Scalariform perforation plates detected in the vessels of M.XVI roots, possibly useful for diagnosis, **1956**, II, 10.

resistance to woolly aphid — confirmed that cell wall structure of the collenchyma is closely related to woolly aphid resistance, **1959**, II, 6.

Histological investigations–apple(s)–*continued*

stems — anatomy of spur stems and vegetative shoots compared, **1956**, II, 10. Differences of over 20% between fibre length of wood from strong and brittle varieties, **1959**, II, 6.

general — notes on the types of studies being made, **1954**, II, 21; **1955**, II, 24; **1956**, II, 10; **1957**, II, 6; **1958**, II, 8; **1959**, II, 6; **1960**, II, 8; **1961**, II, 8.

peaches — *see under* Incompatibility, peaches.

pears — *see under* Incompatibility, pears.

plums — *see under* Incompatibility, plums.

History of Research Station land — **A short history of Research Station land in the parish of East Malling**, by S. C. Pearce and D. W. P. Greenham, **1954**, III, 54. **A short history of Research Station land in the parishes of Ditton and Aylesford**, by S. C. Pearce and D. W. P. Greenham, **1956**, III, 49. **Some further historical information about Research Station land**, by S. C. Pearce and D. W. P. Greenham, **1961**, III, 85.

Honeydew, of pear sucker — notes on, **1955**, II, 44.

Hop(s)–

breeding — *see under* Breeding, hops.

canker (*Fusarium sambucinum*) — notes on, **1955**, II, 38.

composting — *see under* Verticillium wilt, hops, composting.

-damson aphid (*Phorodon humuli*) — *see under* Hop mosaic, virus vector studies.

Defender — *see under* Verticillium wilt, hops, tolerant varieties.

Density — *see under* Verticillium wilt, hops, tolerant varieties.

Janus — *see under* Verticillium wilt, hops, tolerant varieties.

latent virus X — **The influence of a latent virus on the development of nettlehead disease in hop**, by J. T. Legg; extreme sensitivity of Early Prolific to nettlehead apparently due to a latent virus, **1960**, III, 106.

line pattern — *see under* Line pattern virus, hops.

machine picking — *see under* Verticillium wilt, hops, machine picking.

mosaic– — *see also under* Virus diseases, heat treatment, hops.

general — **A mild strain of hop mosaic virus**, by J. T. Legg; two types of hop mosaic identified, lethal and mild, caused by different strains of the mosaic virus, distinguished by the lethal action of the latter on Golding hops, **1958**, III, 116.

virus vector studies — no transmission with hop-damson aphid, **1955**, II, 40, or with various other possible insect vectors, **1956**, II, 28; Eriophyid mites from *Prunus* spp. tested, **1957**, II, 26, but results negative **1958**, II, 28. In repeat tests with large numbers of the hop-damson aphid, **1959**, II, 28; **1960**, II, 30, three plants of a sensitive variety were infected from a Fuggle carrier, **1961**, II, 31.

nettlehead — *see under* Nettlehead, hops.

nickel toxicity — **The nickel content of hop plants, with reference to nettlehead symptoms**, by J. T. Legg and P. J. Ormerod; addition of 1 p.p.m. or more of nickel to Early Prolific hops grown in sand culture induced toxicity symptoms within 13 days; these were different from those caused by nettlehead virus, **1957**, III, 129.

split leaf blotch — *see under* Split leaf blotch, hops.

varieties — *see under* Verticillium wilt, hops, tolerant varieties.

Hop(s)–*continued*

verticillium wilt — *see under* Verticillium wilt, hops.

virus diseases — *see under* Bulletins on progress in research; Hop mosaic; Hop yellow net; Line pattern virus, hops; Nettlehead, hops; Split leaf blotch, hops; Virus diseases, heat treatment, hops; — —, indicator plants, hops.

wilt tolerant — *see under* Breeding, hops; Verticillium wilt, hops, tolerant varieties.

yellow net — **Yellow net—a virus disease of hop,** by J. T. Legg and P. J. Ormerod; characterized by interveinal chlorosis of the leaves; transmitted by grafting but not by sap inoculation of herbaceous hosts, **1960**, III, 105.

Hoplocampa brevis — *see under* Pear sawfly.

,, *flava* — *see under* Plum sawfly.

,, *testudinea* — *see under* Apple sawfly.

Host-parasite studies — *see under* the common name of the disease or pest.

Hover flies — **Some predacious insects of fruit trees: lacewings, ladybirds, and hover flies,** by Elsie Collyer, **1955**, IV, 155.

Humulus americanus — *see under* Virus diseases, indicator plants, hops.

Hydraecia micacea — *see under* Rosy rustic moth.

Imprint method — *see under* Insect catching/counting.

Incompatibility–

cherries — *see under* Breeding, top fruits, rootstocks, cherry.

peaches — notes on, **1954**, II, 24; **1958**, II, 8. **Symptoms of incompatibility induced in a peach by ring grafting with an incompatible rootstock variety,** by Barbara Mosse; growth described of Hale's Early peach on Brompton, ring grafted with Myrobalan B in the rootstock stem, **1954**, III, 76.

pears–

on apple rootstocks — three pear varieties budded on to eighteen apple rootstocks in 1953; maiden trees show varying degrees of incompatibility, but Fertility has grown better than Beurré Hardy or Williams', **1954**, II, 20. **The compatibility and growth of pear scions on apple rootstocks,** by R. J. Garner and Catherine P. Nicoll; all combinations were incompatible, but M.XVI was more compatible than the others and Fertility was comparatively tolerant, **1960**, III, 54.

on *Pyrus calleryana* — three pear varieties budded on *P. calleryana* seedlings have shown signs of incompatibility when three years old, **1957**, II, 6.

on quince rootstocks — notes on, **1956**, II, 21; **1957**, II, 6; **1958**, II, 8; **1961**, II, 29. Abnormalities observed in the phloem of all unions of Williams' Bon Chrétien on quince, **1955**, II, 23. **A selection of Williams' Bon Chrétien pear compatible with quince rootstocks,** by A. F. Posnette and R. Cropley; both compatible and incompatible unions were formed in trees propagated by budding Williams' from English, French and Swiss sources on Quince A. This evidence that the cause of incompatibility is not graft-transmissible suggests that bud mutation, rather than virus infection, is responsible for the differences between clones of the same variety, **1958**, III, 91.

plums — notes on, **1957**, II, 6. All combinations of Malling clonal plum rootstocks compatible except St. Julien J and Common Plum, **1954**, II, 20. In seven-year-old field trial some combinations are beginning to show breakage at the unions; Reeves Seedling incompatible with the rootstock Myrobalan B and also with the varieties Victoria, President, and Oullins Golden Gage, **1955**, II, 24. **Graft incompatibility in plums: interactions between the varieties Victoria,**

Incompatibility–plums–*continued*

President, and Myrobalan B, by Barbara Mosse; Victoria and President not fully compatible, and trees with adjacent President and Myrobalan B components developed strong incompatibility symptoms, **1960**, III, 57.

Indicator plants — *see under* Virus diseases, indicator plants.

Indoleacetic acid — notes on, **1957**, II, 6.

Indolebutyric acid — *see under* Propagation, rootstocks, hardwood cuttings, winter storage; Tree shaping, plums.

Inorganic analysis — *see under* Analysis, chemical, inorganic.

Insect(s),–

beneficial — *see under* Beneficial insects and mites.

catching/counting — *see also under* Statistical studies, fruit tree red spider mite.
A comparison of the imprint and brushing machine methods for estimating the numbers of fruit tree red spider mite, *Metatetranychus ulmi* (Koch), on apple leaves, by D. A. Chant and R. C. Muir; the brushing machine is the more efficient, **1954**, III, 141. **A comparison of bait and light traps for catching codling moths, *Cydia pomonella* (L.)**, by Joan R. Groves; mercury vapour light trap is the more efficient, especially at low population densities, **1954**, III, 146. **On the application of the capture-recapture method to an orchard population of *Blepharidopterus angulatus* (Fall.) (Hemiptera-Heteroptera, Miridae)**, by R. C. Muir, **1957**, III, 140. **A note on the knock-down method for estimating numbers of insect predators on fruit trees**, by R. C. Muir and R. G. Gambrill; efficiency of the method varied between 48 and 77%, **1959**, III, 109. **A comparison of pitfall trapping and soil sampling in assessing populations of two species of ground beetles (Col.: Carabidae)**, by J. B. Briggs; numbers of beetles trapped were closely related to grass minimum temperature, but bore no relationship to the actual population present, **1960**, III, 108.

fauna — **Problems arising from the use of insecticides; effect on balance of animal populations**, by A. M. Massee; discusses effects in relation to fluctuations in orchard populations of apple capsid bug, fruit tree red spider mite, red spider mite, and woolly aphid, **1954**, III, 137. **The fauna of the orchard**, by Prof. V. B. Wigglesworth; Amos Memorial Lecture, **1959**, III, 39.

general — **Notes on some interesting insects observed**, by A. M. Massee, **1954**, III, 133; **1955**, III, 131; **1956**, III, 131; **1957**, III, 133; **1958**, III, 118.

populations — *see under* Insect catching/counting; Insect fauna.

predacious — *see under* Beneficial insects and mites, predators.

rearing — in the laboratory, notes on, **1955**, II, 47; **1957**, II, 29; **1958**, II, 32; **1959**, II, 31, 32; **1960**, II, 32; **1961**, II, 33.

trapping — *see under* Insect catching/counting.

Insecticide(s)– — *see also under* Acaricides; Beneficial insects and mites, predators, fruit tree red spider mite; Harvest residues; Insect fauna; Spray damage investigations; and the name of the insect to be controlled.

analysis — notes on, **1956**, II, 35; III, 153; **1957**, II, 32; **1958**, II, 35; **1959**, II, 34; **1960**, II, 35; III, 116.

compatibility — notes on, **1954**, II, 22; **1955**, II, 48.

persistence– — notes on various chemicals, especially those of potential value for controlling codling moth, **1956**, II, 35, 36; **1957**, II, 32; **1958**, II, 35; **1959**, II, 34; **1960**, II, 35; **1961**, II, 35.

Insecticide(s)–persistence–*continued*

aldrin — applied to strawberries pre-blossom left residues in the soil that were toxic to ground beetles throughout the fruiting period, **1958**, II, 33.

DDT — notes on, **1955**, II, 48; **1957**, II, 32; **1959**, II, 34. Similar initial deposits from a wettable powder and an emulsion, but after two months amount of DDT remaining from the wettable powder was about half that from the emulsion, **1954**, II, 42; after three weeks 30 p.p.m. were recovered from leaves sprayed with the wettable powder, compared with 220 p.p.m. from emulsion-sprayed leaves, **1956**, II, 36. **Some observations on the effects of formulation on the persistence of DDT and its toxicity to certain orchard insects and mites**, by R. P. Tew and Joan R. Groves; greater persistence of DDT deposited from emulsions than from suspensions, **1956**, III, 152. In codling moth trial, persistence (half-life) of DDT on apple foliage was nine days, **1958**, II, 35.

dieldrin — initial deposits on strawberry fruits of 5–7 p.p.m. fell to less than 1 p.p.m. in two weeks, **1955**, II, 48.

malathion — **Harvest residues of malathion on soft fruits and apples**, by R. P. Tew and Joan M. Sillibourne; rate of decay studies on loganberry, apple and strawberry show that the half-life of malathion is only 1·5 to 2 days, **1960**, III, 116.

Intermediate stem-pieces — *see under* Double-working, interstocks.

Intermittent mist — *see under* Propagation, rootstocks, softwood cuttings.

Internal breakdown — *see under* Functional disorders, internal breakdown.

Internode growth — *see under* Growth analysis, shoots and stems.

Interstocks — *see under* Double-working, interstocks.

Iron–

analysis — *see under* Analysis, chemical, inorganic, iron; —, spectrographic.

deficiency — *see under* Mineral deficiencies, iron.

leaf intake — from foliar applications of ferrous sulphate; intake rapid at first and iron content of the leaf increased by about 200 p.p.m. within an hour; it then usually ceases and is resumed overnight when the humidity rises, **1961**, II, 22.

nutrition — *see under* Mineral nutrition, iron and magnesium.

Irregular bud-break — *see under* Propagation, apples, irregular bud-break.

Irrigation–

apples — *see also under* Functional disorders, bitter pit; — —, low temperature breakdown.
Trial with irrigation at 10, 20 and 50 cm Hg tension, on sandy soil, with Laxton's Superb. Irrigation at 10 cm Hg tension increased shoot growth but reduced yield of fruits of commercial size, **1954**, II, 22. Trees watered since 1953 at 10 and 20 cm Hg tension have yielded nearly 4 bushels compared with 3 bushels from those watered at 50 cm Hg tension and the controls; wettest treatment has given 70% and intermediate treatment 50% more fruit in the size grades $2\frac{1}{4}$–3 in. than the controls, **1956**, II, 23. Unwatered trees showed yellowing and early defoliation, **1959**, II, 18, and effects of drought in the following year; both irrigation treatments gave 50% increase in yield, reflecting the difference in tree size, **1960**, II, 20. Irrigation treatments now ceased, causing a check to the trees similar to that after grassing down, **1961**, II, 20.
Trial with one level of irrigation and two levels of nitrogen, on sandy soil, with Laxton's Fortune. Notes on, **1954**, II, 22; **1959**, 11, 18.

Irrigation–apples–*continued*

Irrigation since 1953 at 20 cm Hg tension has had a similar effect on crop to that of high nitrogen applications; yields from unwatered trees receiving low nitrogen were considerably lower, **1956**, II, 23; **1958**, II, 21. Irrigation level changed in 1957 to 10 cm Hg tension, **1958**, II, 21. Irrigation and high nitrogen applications together now giving a completely additive effect on growth and a partially additive effect on yield; these treatments together increased the season's crop by 95% and separately by about 60% each, **1960**, II, 20.

Trial with irrigation in grass. In trial with Cox at Luddington E.H. Station, trees showed marked response to irrigation, **1959**, II, 18; growth stimulated excessively by irrigation, **1960**, II, 20; **1961**, II, 20.

black currants — *Trial with two levels of irrigation and applied nitrogen, with Amos Black* (planted in 1956). Bushes that were watered late last year made more shoot growth, resulting in a 15% increase in crop, **1958**, II, 21. Irrigation improved yields by about 40% and strikingly increased amount and vigour of new growth, **1959**, II, 18. Even in this wet summer irrigation improved yields by 60%, reflecting the serious effect of the 1959 drought on the growth of the unwatered bushes; again no marked benefit from the high nitrogen treatment. Comparison with orthodox pruning superimposed, **1960**, II, 20. Yields of the unpruned irrigated bushes averaged 9 to 10 tons/acre, compared with 6·5 to 7 tons/acre for the unpruned controls, **1961**, II, 20.

raspberries — *Trial with Malling Exploit and Malling Jewel* (planted in 1956). Growth and berry size increased by irrigation, **1957**, II, 18. Increased yields owing to better cane growth produced the previous year; **1958**, II, 21. Irrigation increased yields of both varieties by about 35% and greatly increased the amount and vigour of new growth, **1959**, II, 18. Increases of 11% and 17% in crops of Jewel and Exploit respectively, compared with the unwatered plots; ripening of fruit of both varieties was delayed 8–10 days on the irrigated plots, compared with the unwatered and the mulched plots. No advantage of frequent light applications over heavier less frequent ones, and former treatment will be replaced by a single application of water prior to picking, **1960**, II, 20. Increase in yield of Jewel amounted to 40% and of Exploit 14%; with latter variety only, this was largely due to increased berry size. These increases were similar to those due to mulching, **1961**, II, 20.

Isochlorogenic acid — notes on, **1954**, II, 33; **1955**, II, 36.

Italy — **Fruit growing in Northern Italy**, by A. P. Preston, **1960**, IV, 123.

Janus — *see under* Verticillium wilt, hops, tolerant varieties.

Jewel — *see under* Raspberries, Jewel.

'June' drop — *see under* Fruit drop, apples.

Karathane — *see under* Dinocap.

Katabatic winds — these downhill winds are strongest over snow-covered ground, while a covering of long grass is the next most favourable condition. They can be deviated by erecting a wall or thick hedge diagonally across the upper slopes, **1958**, III, 45.

Kelthane — *see under* Acaricides, persistence; Fruit tree red spider mite, field trials; Skin finish, apples.

Kinetin — *see under* Tree shaping, cherries; — —, plums.

Knock-down method — *see under* Insect catching/counting.

Lacewings, Ladybirds — **Some predacious insects of fruit trees: lacewings, ladybirds and hover flies**, by Elsie Collyer, **1955**, IV, 155.

Landmark — *see under* Raspberry tasting trials.

Land uniformity — *see under* Soil uniformity.

,, variation — *see under* Soil variation.

Large fruit bark beetle (*Scolytus mali*) — observations on, **1958**, III, 118.

Larkfield Plantation — *see under* History of Research Station land.

Late flowering apple varieties — *see under* Breeding, top fruits, apples, late flowering.

Lead arsenate — *see under* Beneficial insects and mites, predators, fruit tree red spider mite; Codling moth, insecticide trials; Harvest residues, apples; Spraying programme.

Leaf–

,, abscission — *see under* Leaf fall.

,, analysis — *see under* Analysis, chemical, inorganic; —, —, organic, leaves; Mineral composition, apple plants.

,, areas– — **A method for the rapid determination of leaf areas in the field,** by G. H. Freeman and B. D. Bolas: method based on a grid, **1955**, III, 104. Grid method much the most rapid and, for whole plants, as accurate as other methods, **1956**, II, 18. **A photometer for estimating the area of samples of detached leaves**, by D. H. Maggs, **1956**, III, 107. **A comparison of methods of measuring leaf areas in the field**, by G. H. Freeman; a direct-reading grid is more rapid and no less accurate than the method of counting squares, **1957**, III, 83. Notes on methods of estimating the leaf area on large trees, **1960**, II, 16.

in relation to growth — **The limit of plant productivity**, by Prof. G. E. Blackman; Amos Memorial Lecture, **1961**, III, 39.

,, -bud cuttings — *see under* Propagation, blackberries.

,, and bud eelworms (*Aphelenchoides* spp.) — *see under* Eelworms, leaf and bud.

,, -count thinning method — *see under* Fruit thinning, apples.

,, curling midge (*Dasyneura* sp.) — on cherry; observations on, **1954**, III, 135.

,, -curling plum aphid (*Brachycaudus helichrysi*) — observations on, **1956**, III, 133.

,, cuticle — *see under* Plant cuticle.

,, fall– — *see also under* Spray damage investigations.

apples — in irrigation trial on sandy soil, associated with artificially-droughted trees, **1955**, II, 26, and the unwatered controls, **1959**, II, 18. In manurial trial with Cox, occurred on the fruit-bearing part of many of the trees still under cultivation, but not on the heavier-bearing trees under grass, **1958**, II, 20; confined almost entirely to the upper parts of the crowns of the trees, mostly on the grass plots, **1959**, II, 18. Associated with magnesium deficiency, **1959**, II, 19. In relation to control of apple canker, **1959**, III, 90.

cherries — **The effects of cotton seed oil on the control of bacterial canker of cherry with an early autumn spray schedule of Bordeaux mixture**, by J. E. Crosse and Margery Bennett; Bordeaux mixture sprays alone advanced leaf fall by 2–3 weeks; where cotton seed oil at 0·75% v/v was included, no defoliant effects were seen until after the third spray on 15th October. Cotton seed oil alone had no effect on the rate of defoliation, **1958**, III, 93. Three pints of cotton

Leaf fall–cherries–*continued*

seed oil per 100 gallons of 4:6:100 Bordeaux mixture ineffective, **1960**, II, 37, but 4½ pints prevented defoliation as effectively as 6 pints, **1961**, II, 37.

Leafhoppers–

on apples — notes on, **1956**, II, 32; **1957**, II, 29; **1958**, II, 32; **1959**, II, 31, 32. Observations on *Typhlocyba froggatti*, **1955**, III, 132.

on blackberries — *Macropsis* spp. effectively controlled by malathion, **1957**, II, 29.

virus vector studies — *see also under* Green petal virus, virus vector studies; Nettlehead, hops, virus vector studies; Rubus stunt virus; Sudden wilt, blackberries.
a population of *Leopotettix dilutior* was found that is naturally infected with a virus thought to be in the yellows group, **1958**, II, 32. Naturally infected specimens of *Thamnotettix dilutior* transmitted a virus causing symptoms in strawberries similar to those of stolbur disease, **1959**, II, 27.

Leaf, influence on growth — *see also under* Bud development.
The limit of plant productivity, by Prof. G. E. Blackman, **1961**, III, 39.

,, intake, copper — *see under* Copper damage.

iron — *see under* Iron, leaf intake.

magnesium — *see under* Magnesium, leaf intake.

,, midge, pear — *see under* Pear leaf midge.

,, roll, cherry — *see under* Cherry leaf roll.

,, scorch, apples — *see under* Copper damage; Mineral deficiencies, potassium; Spray damage investigations, apples.

black currants — *see under* Spray damage investigations, black currants.

pears — *see under* Spray damage investigations, pears.

,, spot–

black currants — *see under* Black currant leaf spot.

cherries — *see under* Bacterial canker, cherries.

plums — *see under* Bacterial canker, plums.

,, wetness periods — *see under* Apple scab, infection periods.

Leopotettix dilutior — *see under* Leafhoppers, virus-vector studies.

Light intensity — rooted layers grown in pots under four degrees of shade, from 20% to full daylight; greatest increment made in full daylight, but the largest leaves, greatest leaf area and the longest shoots were produced in 70% daylight, **1958**, II, 15. **The limit of plant productivity**, by Prof. G. E. Blackman; Amos Memorial Lecture, **1961**, III, 39.

,, traps — **A comparison of bait and light traps for catching codling moths, *Cydia pomonella* (L).**, by Joan R. Groves; mercury vapour light trap is the more efficient, especially at low population densities, **1954**, III, 146.

Lime-induced chlorosis — *see under* Mineral deficiencies, iron.

,, -sulphur — *see under* Apple mildew, field trials; Apple scab, field trials; Beneficial insects and mites, predators, fruit tree red spider mite; Fungicide testing, powdery mildews; Pear scab, field trials; Spraying, concentrate; Spray damage investigations, apples; — — —, black currants; — — —, gooseberries; Spraying programme; Strawberry powdery mildew.

Line pattern virus–

hops — *see also under* Virus diseases, indicator plants, hops. transmission studies, **1956**, II, 28.

plums — *see under* Plums, virus diseases; Virus diseases, heat treatment, plums; — —, indicator plants, plums.

Little cherry disease — **A little cherry disease in England**, by A. F. Posnette and R. Cropley; symptoms on trees in Worcestershire indicate presence of a virus disease similar to the little cherry disease previously reported only from N. America; the disease spreads in orchards and renders the crop unsaleable, **1957**, III, 122.

Lloyd George — *see under* Raspberry varieties.

Loganberry(ies)–

cane spot (*Elsinoë veneta*) — *see under* Cane spot, loganberries.

degeneration virus — *see under* Loganberries, virus diseases.

fan training method — notes on, **1959**, III, 48.

frost damage — *see under* Frost damage, loganberries.

harvest residues — *see under* Harvest residues, loganberries.

LY 59 sub-clone — *see under* Loganberries, Special Stock; —, strain trials.

propagation — *see under* Propagation, loganberries.

Special Stock — LY 59 now included in the Ministry's certification scheme, **1960**, II, 10.

strain trials — plants of five promising clones selected for virus testing and field trial, **1955**, II, 28; **1956**, II, 13; notes on cropping, **1958**, II, 10; **1959**, II, 8. **The performance of some virus-tested loganberry clones**, by A. Beryl Beakbane and M. V. Labern; four clones from Eire and one from New Zealand compared, with data extending over three years on relative vigour, yield, fruit size, and susceptibility to frost damage, **1959**, III, 48.
A further trial of virus-tested clones planted, including a sub-clone (LY 59) of the original E. Malling selection, **1959**, II, 8; first crop of all clones was exceptionally heavy, averaging 12 lb per plant (about 4 tons per acre), **1960**, II, 10; second crop approx. $3\frac{3}{4}$ tons per acre, **1961**, II, 10.

virus diseases — *see also under* Rubus stunt virus.
notes on, **1954**, II, 36; **1955**, II, 40; **1956**, II, 28. **A virus-degeneration of loganberry**, by J. T. Legg; a virus detected in weak plants, but not in any of the vigorous plants tested, was shown to be responsible for the degeneration of loganberries; this virus caused symptoms in *Rubus henryi* but not in any of the other *Rubus* hosts used, **1959**, III, 102.

virus tested — *see under* Loganberries, Special Stock; Loganberries, strain trials.

Longidorus sp. — *see under* Eelworms, soil migratory, virus vector studies.

Lophopteryx capucina — *see under* Coxcomb prominent.

Low temperature breakdown — *see under* Functional disorders, low temperature breakdown.

,, -volume spraying — *see under* Spraying, concentrate.

Lucanus servus — *see under* Stag beetle.

LY 59 — *see under* Loganberries, LY 59 sub-clone.

Lygus pabulinus — *see under* Common green capsid.

M.IX crosses — *see under* Rootstocks, apple.

M.26 — *see under* Propagation, apples, irregular bud-break; Rootstocks, apple.

Machine picking, hops — *see under* Verticillium wilt, hops, machine picking.

Macropsis spp. — *see under* Leafhoppers, on blackberries; Rubus stunt virus.

Macrosteles spp. — *see under* Green petal virus, virus vector studies.

Macrosiphum euphorbiae — *see under* Potato aphid.

Magnesium–

analysis — *see under* Analysis, chemical, inorganic, magnesium; —, spectrographic; Mineral composition, apple plants.

availability — *see under* Soil properties.

chloride — *see under* Magnesium, leaf intake; Mineral deficiencies, magnesium.

deficiency — *see under* Mineral deficiencies, magnesium.

foliar sprays — *see under* Apple mildew, in relation to magnesium nutrition; Mineral deficiencies, magnesium.

leaf intake — *see also under* Analysis, chemical, inorganic, magnesium.
the chloride and the nitrate appear to be taken in more readily than the sulphate, **1958**, II, 38. More rapid intake of the chloride than the sulphate confirmed, but at 1·6% (equivalent magnesium content to 2% Epsom salt) the chloride caused some damage, **1959**, II, 36. Intake initiated only by a wet deposit, but appreciable quantities of magnesium are not always taken in even when the leaves are exposed to a wet deposit for an hour or more, **1960**, II, 22. No increase in rate of intake (compared with magnesium sulphate alone) with a deliquescent mixture of magnesium sulphate and urea, **1961**, II, 22.

nutrition — *see under* Apple mildew, in relation to magnesium nutrition; Mineral nutrition, magnesium.

/potassium ratio — *see under* Mineral nutrition, magnesium and potassium.

soil applications — *see under* Mineral deficiencies, magnesium.

sulphate — *see under* Epsom salt.

Malathion — *see under* Harvest residues, apples; — —, loganberries; — —, raspberries; — —, strawberries, malathion; Insecticide persistence, malathion; Leafhoppers, on blackberries; Spray damage investigations, black currants; and the common name of the insect to be controlled.

Maleic hydrazide — *see under* Weedkillers, top fruit.

Malling apple rootstocks — *see under* Rootstocks, apple.

,, -Merton apple rootstocks — *see under* Rootstocks, apple.

,, raspberry varieties — *see under* Raspberries, Enterprise; —, Exploit; —, Jewel; —, Landmark; —, Promise.

Malus platycarpa — *see under* Virus diseases, indicator plants, apple.

Manganese — *see under* Analysis, spectrographic; Mineral composition, apple plants; Mineral deficiencies, manganese.

Manuring– — *see also under* the individual nutrients.

apples — *see also under* Gloeosporium rots, orchard factors, manuring and soil management; Irrigation, apples; Mineral nutrition; Skin finish, apples, general; Soil management, apples, grass sward.
Classical trial with Cox on M.XII. Notes on, **1954**, II, 21; **1955**, II, 25; **1956**, II, 22; **1957**, II, 18; **1959**, II, 18. To avoid further acidification of the soil, the nitrogen treatment was changed from sulphate of ammonia at 6 cwt per acre per year to 'Nitro-chalk' at the equivalent rate (8 cwt per acre), **1958**, II, 20. Marked crop response to nitrogen applications on both grass and cultivated plots, **1960**, II, 21; **1961**, II, 20.
Trial started at Efford to find the most effective time of application of nitrogenous fertilisers to trees in grass, **1959**, II, 19.

Manuring–*continued*

black currants — application of nitrogen after picking, instead of in the spring, had no effect on yields, **1954**, III, 85. No marked difference in effect on crop between two levels of applied nitrogen, **1958**, II, 21; **1960**, II, 21.

cherries — notes on, **1954**, II, 22. Trial started comparing sulphate of ammonia at 3, 6, and 9 cwt per acre with 'Nitro-chalk', **1959**, II, 19.

general — **The nutrition of fruit crops—a retrospect**, by Prof. T. Wallace, **1955**, III, 53.

pears — trial started at Efford, with three levels of nitrogen, two of phosphate, and two of potash, **1959**, II, 19.

plums — in seven-year-old pruning and manuring trial with Victoria, an effect of nitrogen is becoming apparent, **1955**, II, 26.

strawberries — trial started comparing farmyard manure, inorganic nitrogen fertilizers, and heavy dressings of straw, **1960**, II, 21.

March moth (*Alsophila aescularia*) — notes on, **1955**, III, 143; **1957**, III, 134.

Marianna — *see under* Rootstocks, plum, general.

Marketing, fruit — notes on, **1954**, I, 16; **1955**, I, 18; **1956**, I, 4; **1957**, I, 2; **1958**, I, 3; **1959**, I, 2; **1960**, I, 2; **1961**, I, 3.

Mazzards — *see under* Breeding, top fruits, rootstocks, cherry; Rootstocks, cherry.

MCPB — *see under* Weedkillers, black currants; —, raspberries.

Melolontha melolontha (syn. *M. vulgaris*) — *see under* Cockchafer.

Melprex — *see under* Dodine acetate.

Mendip Cross — *see under* Black currants, Mendip Cross.

Mercury sprays — *see under* PMC.

,, vapour light traps — *see under* Light traps.

Meristem development — *see under* Bud development.

Merton 793 — *see under* Collar rot, apples.

Metasystox (demeton-methyl) — *see under* Spraying programme; and the common name of the insect to be controlled.

Metatetranychus ulmi — *see under* Fruit tree red spider mite.

Meteorology, horticultural — *see also under* Apple scab, infection conditions; Frost; Katabatic winds; Weather conditions.
notes on, **1960**, II, 12; **1961**, II, 12. **Meteorological factors in the growth of plants**, by Sir David Brunt, **1958**, III, 41.

Mevinphos (Phosdrin) — *see under* Apple-grass aphid; Apple sucker; Rosy apple aphid.

Midges — *see under* the common names of midges.

Mildew — *see under* the name of the host.

Mineral composition, apple plants — *see also under* Analysis, chemical, inorganic.
notes on, **1954**, II, 32; **1955**, II, 36; **1956**, II, 24; **1957**, II, 20; **1958**, II, 23; **1959**, II, 21; **1960**, II, 23; **1961**, II, 22. **A note on differences in mineral content of apple leaves associated with fruiting and non-fruiting of biennial bearing trees**, by A. C. Mason; N, P, Mg, Ca, and Mn occurred in greater concentrations in the leaves of trees of Miller's Seedling in their 'on' year, **1954**, III, 122. Details of the distribution of elements in the roots, trunk, and branches of a mature tree of Cox, **1957**, II, 20. Effects of varying osmotic pressures on mineral composition of plants grown in water culture, **1957**, II, 20; **1958**, II, 23. Apple rootstocks grown in pots with moist soil contained 30% *less* nitrogen, 50% more phosphorus, and 15% more potassium

Mineral composition, apple plants–*continued*

than those grown in relatively dry soil, after 13 weeks, **1958**, II, 23. Apple rootstocks grown in sand culture tolerated 12·5 p.p.m. aluminium sulphate, but 62·5 p.p.m. caused some ill effects, **1958**, II, 23. **A progress report on the mineral composition of leaves from selected apple orchards in the Eastern counties of England,** by A. C. Mason and A. B. Whitfield; leaf samples from 9 cultivated and 22 grassed-down orchards analysed for N, P, K, Ca, and Mg, **1958**, III, 86. Seasonal changes in uptake of N, P, K, Ca and Mg by apple trees; concentrations of these elements changed appreciably during rapid leaf growth (April) and shoot growth (June), **1959**, II, 21. Trial started at Luddington to determine mineral composition of Cox trees on M.VII under various nutritional conditions, **1960**, II, 22. Use of a machine to reduce whole apple trees to chips which can be easily sampled, **1960**, II, 23.

,, deficiencies– *see also under* Mineral nutrition.

boron notes on, **1955**, III, 58, 60.

calcium notes on, **1955**, III, 57.

copper notes on, **1955**, III, 58.

general **The nutrition of fruit crops—a retrospect**, by Prof. T. Wallace, **1955**, III, 53.

iron notes on, **1954**, II, 33; **1955**, II, 36; III, 58, 59, 60. Chlorotic apple leaves when sprayed with EDTA showed marked improvement in colour, **1954**, II, 33.

iron and magnesium **How spray cultures assist the study of apple nutrition**, by Anne V. Delap and Elsie M. Ford; effects of induced iron and magnesium deficiencies on the growth of rooted layers of M.VII, **1957**, IV, 159.

magnesium *see also under* Apple mildew, in relation to magnesium nutrition; Leaf fall, apples; Mineral deficiencies, iron and magnesium.
notes on, **1955**, III, 57, 60.
Trials with magnesium-deficient dwarf pyramid trees of Edward VII on M.VII. Five foliar applications of 2% Epsom salt at intervals of two weeks prevented deficiency symptoms till late in the season, **1954**, II, 22, 33; **1956**, II, 22; **1957**, II, 18; the total weight of crop over the first four years was increased by 50%, **1957**, II, 18, and during the five years of the trial by 70% (equivalent to an increase of 775 bushels per acre during the whole period); this was largely due to an increase in the number of fruits, **1959**, II, 19.
Trial started comparing pre- and post-blossom spray applications, **1959**, II, 19; five *post-blossom* sprays of 2% Epsom salt or of 0·83% magnesium chloride prevented the development of deficiency symptoms throughout the season, **1960**, II, 21; **1961**, II, 21, and increased the retention of fruits, **1961**, II, 21; *pre-blossom* sprays prevented early-season deficiency symptoms on fruiting spur leaves, **1960**, II, 21; **1961**, II, 21, but did not reduce the severity of symptoms developing later on extension shoots, **1960**, II, 21, and did not increase fruit set, **1961**, II, 21.
Trial with magnesium-deficient MM.102 and M.IV rootstocks.
Notes on, **1954**, II, 33; **1956**, II, 22; **1957**, II, 15; **1961**, II, 21. **The control of magnesium deficiency in apple rootstock stoolbeds: progress report**, by Elsie M. Ford; nine foliar applications of 2% Epsom salt completely prevented deficiency symptoms each year; three applications were only partially effective. Soil applications at 6 cwt/acre caused a slight reduction of symptoms and improvement in growth in the third year, **1957**, III, 106. Continued slight response to soil applications, **1958**, II, 20; **1959**, II, 19; **1960**, II, 22; **1961**, II, 21.

Mineral deficiencies–magnesium–*continued*

Trial with mature trees on M.VII and M.II. Notes on effects of post-blossom sprays of Epsom salt, **1960**, II, 22; **1961**, II, 21.

manganese — notes on, **1955**, II, 36; III, 58.

molybdenum — notes on, **1955**, III, 59.

nitrogen — notes on, **1955**, III, 59.

phosphorus — notes on, **1955**, III, 57, 60.

potassium — notes on, **1955**, III, 57, 59.

zinc — notes on, **1955**, III, 58, 60.

,, nutrition– — *see also under* Manuring; Mineral composition, apple plants; Mineral deficiencies.

general — **The nutrition of fruit crops—a retrospect**, by Prof. T. Wallace, **1955**, III, 53.

iron and magnesium — *Spray culture experiments, with various levels of magnesium and iron supply, using rooted layers of M.VII.* Notes on, **1954**, II, 33; **1955**, II, 36; **1956**, II, 22. **How spray cultures assist the study of apple nutrition**, by Anne V. Delap and Elsie M. Ford; effects of iron and magnesium on growth are described and discussed in relation to orchard practice, **1957**, IV, 159. Good growth may be obtained by supplying iron or magnesium to the leaves of rootstocks without those elements in the nutrient supply to their roots, **1958**, II, 20. Reduction in total plant dry weight due to magnesium deficiency could be attributed to the loss of photosynthetic leaf area by necrosis and leaf fall; magnesium moved preferentially to the apical leaves of deficient plants, but accumulated in the lower leaves when given in good supply, **1959**, II, 19.

magnesium — *see under* Apple mildew, in relation to magnesium nutrition; Mineral nutrition, iron and magnesium; — —, magnesium and potassium.

magnesium and potassium — in sand culture experiments, symptoms of magnesium deficiency developed first on plants with a high ratio of potassium to magnesium in their nutrient solution, irrespective of the magnesium concentration; potassium deficiency symptoms appeared only on plants with a very low supply of potassium, **1960**, II, 22.

nitrogen — *Urea spraying.* In trial with magnesium-deficient dwarf pyramid trees of Edward VII on M.VII, spraying with 0·5% urea five times each season at fortnightly intervals commencing at petal-fall increased the crop over a 4-year period, possibly due to a reduction in the drop of fruitlets, **1957**, II, 18; two pre-blossom sprays tended to increase fruit set, **1961**, II, 21.
Sand culture experiments. Growth of M.II rootstocks adversely affected by high concentrations of nitrogen, **1957**, II, 21. In trial with Cox on M.VII comparing effects of differential nitrogen treatments, omission of nitrogen made little difference to their growth in the early part of the season, but by August they were less vigorous and their leaves smaller and paler, **1960**, II, 21; in the following year their blossoming was reduced and delayed and fruit set was negligible, **1961**, II, 21.

nitrogen and potassium — in sand culture experiments, highly contrasted levels of nitrogen (28 to 672 p.p.m.) and potassium (15·6 to 624 p.p.m.) induced relatively small differences in the growth of apple rootstocks, **1959**, II, 21. **Effect of nutritional conditions on the growth and chemical composition of 'source' plants and on the rooting of stem cuttings derived therefrom. I. Effect on the growth of the 'source' plants,** by Ambika Prasad; growth of Myrobalan B, Crab C, and

Mineral nutrition–nitrogen and potassium–*continued*
golden willow varied directly with the level of nitrogen and potassium and with pot size, **1955**, III, 108.

nutrient spraying — *see under* Apple mildew, in relation to magnesium nutrition; Mineral deficiencies, iron; — —, magnesium; Mineral nutrition, iron and magnesium; — —, nitrogen.

Miner, cambium — *see under* Cambium miner.

Mist propagation — *see under* Propagation, rootstocks, softwood cuttings.

Mites– — *see also under* Beneficial insects and mites; and the common names of the mites.

Bryobia mite strains — notes on **1957**, II, 29; **1958**, II, 32; **1959**, II, 31; **1960**, II, 32. Observations on gooseberry red spider mite, **1954**, III, 135; **1955**, III, 133. Severe infestations on Conference pears, Lord Derby, and Bramley's Seedling, causing discoloration of the leaves; on Lord Derby considerable defoliation and fruit drop resulted. A species found feeding on ivy near latter plantation, **1956**, III, 133. *Petrobia latens* noted on cherry and Myrobalan plum in Kent, **1960**, II, 32.

Eriophyid — *see under* Hop mosaic, virus vector studies.

Phytoptid — *see also under* Black currant gall mite.
Vasates fockeui caused unusual damage to the leaves of Gaucher cherry, **1955**, III, 134. Observations on *Oxypleurites neglectus*, **1956**, III, 133. *Acaricalis hederae*, a free-living species on ivy, recorded for the first time in England, **1960**, II, 34.

Tetranychid — *see also under* Fruit tree red spider mite; Hop mosaic, virus vector studies; Mites, Bryobia mite strains; Red spider mite.
Some Tetranychid mites on fruit trees, by Elsie Collyer and Joan R. Groves; includes key for identifying six species, **1955**, III, 135.

Typhlodromid — *see also under* Beneficial insects and mites, predators, fruit tree red spider mite.
notes on, **1954**, II, 39.

MM. rootstocks — *see under* Rootstocks, apple.

Molybdenum — *see under* Mineral deficiencies, molybdenum.

Monuron — *see under* Weedkillers, black currants; —, raspberries.

Mosaic — *see under* Apple mosaic virus; Hop mosaic; Strawberry mosaic.

Mother Tree Scheme — *see also under* Rootstocks, apple, virus-tested; —, cherry, virus-tested; —, pear, virus-tested.
notes on the selection, virus testing, and propagation of top-fruit varieties and strains, for distribution to Members, **1957**, II, 25; **1958**, II, 28; III, 146; **1959**, II, 11, 27; III, 95; IV, 138; **1960**, I, 5; II, 29; **1961**, II, 8. **The production and distribution of virus-free fruit trees at East Malling**, by R. V. Harris and A. F. Posnette, **1955**, III, 115. **Virus-tested rootstocks and scion varieties available at East Malling Research Station**, by A. F. Posnette and T. N. Hoblyn; lists rootstocks and varieties of apples and cherries expected to be available to Members in 1956 and 1957, **1955**, IV, 151. **The Mother Tree Scheme**, by A. F. Posnette; lists 23 apple, 5 pear, 20 cherry and 10 plum varieties of which virus-tested Mother Trees are available to Members, **1961**, IV, 125.

Mottled arum aphid (*Aulacorthum circumflexum*) — bred as prey for a number of insect predators, **1955**, II, 47.

,, umber moth *Erannis defoliaria*) — notes on biology, **1955**, III, 143.

Multiple central leader system — *see under* Pruning, pears; Tree form, apples.

Multivariate analysis — notes on, **1958**, II, 13; **1959**, II, 13. **Some recent applications of**

Multivariate analysis–*continued*

multivariate analysis to data from fruit trees, by S. C. Pearce, **1958,** III, 73.

Mycorrhiza — notes on, **1956,** II, 14; **1959,** II, 10. Mycorrhizal apple seedlings and leaf cuttings grew better than controls, **1954,** II, 26; **1955,** II, 29. Chemical analysis of apple seedlings (especially the roots) showed that mycorrhizal infection can affect the balance of nutrient uptake, **1956,** II, 14; **1957,** II, 10. Inoculation with an *Endogone* sp. resulted in 100% mycorrhizal infections on apple seedlings, and with *Pythium ultimum* 26%, **1958,** II, 11.

Myrobalan B– — *see under* Incompatibility, peaches; —, plums; Propagation, plums; Rootstocks, plum; Stem-building, plums.

shoot extracts — *see under* Growth substances.

Myzus cerasi — *see under* Cherry blackfly.

Naphthalene acetamide (NAM) — *see under* Biennial bearing, deblossoming trials; — —, fruit thinning trials; Fruit thinning, apples.

„ acetic acid (NAA) — *see under* Biennial bearing, fruit thinning trials; Breeding, top fruits, apple-pear hybrids; Fruit splitting, cherries; Fruit thinning, apples.

Necrotic line pattern virus — *see under* Cherries, virus diseases.

„ ring spot — *see under* Cherry necrotic ring spot; Virus diseases, indicator plants, plums.

Nectria galligena — *see under* Apple canker.

Nematodes — *see under* Eelworms.

Nematus olfaciens — *see under* Black currant sawfly.

Net assimilation rate — notes on net assimilation rates of Laxton's Superb on M.XXV, M.VII, and the dwarfing 3431, **1960,** II, 15. **The limit of plant productivity,** by Prof. G. E. Blackman; Amos Memorial Lecture, **1961,** III, 39.

Nettle, annual — *see under* Verticillium wilt, hops, weed hosts; Weedkillers, strawberries.

Nettlehead, hops– — *see also under* Bulletins on progress in research; Virus diseases, indicator plants, hops.

general — **The spread of nettlehead disease and its association with split leaf blotch virus in certain hop varieties,** by J. T. Legg; nettlehead spread at different rates among clones of six new hop varieties and two clones of Fuggle. Suggestion that differences in susceptibility to nettlehead may be due to genetical differences between varieties, or to differing proportions of plants being infected with split leaf blotch virus; evidence for such a complex is inconclusive, **1954,** III, 128. Natural transmission can occur during April, May and June; examination of crowns of hop plants showed that the virus is not always fully systemic, **1955,** II, 40. Investigation of possible alternative weed hosts, **1956,** II, 28; IV, 193, but attempts to transmit the virus from them negative, **1957,** II, 25. **Research on hop virus diseases at East Malling,** by J. T. Legg and P. J. Ormerod; reviews conflicting evidence on mode of spread of nettlehead, **1958,** IV, 157. Field trial planted in a nettlehead site, using hop plants with either their roots or their bines enclosed in polythene, to find out whether infection occurs through the roots or the aerial parts of the plant, **1959,** II, 28; 19 of these plants, all with their roots exposed to the soil, have developed line pattern symptoms, **1961,** II, 30. Transmitted to Early Prolific plants by sap inoculation, **1960,** II, 30; **1961,** II, 30, but not to a range of 28 other herbaceous hosts, **1961,** II, 30. **The influence of a latent virus on the development**

Nettlehead, hops–general–*continued*

of nettlehead disease in hop, by J. T. Legg; extreme sensitivity of Early Prolific to nettlehead apparently due to a latent virus which shortens the incubation period of nettlehead virus and may increase the severity of the symptoms, **1960**, III, 106.

in relation to nickel content of hop plants — **The nickel content of hop plants with reference to nettlehead symptoms,** by J. T. Legg and P. J. Ormerod; the addition of 1 p.p.m. or more of nickel to healthy Early Prolific hop plants grown in sand culture induced toxicity symptoms within 13 days; nettlehead-infected plants developed typical disease symptoms when grown in sand culture with a low nickel content, **1957**, III, 129.

virus vector studies — *see also under* Eelworms, soil migratory, virus vector studies. tests with froghoppers and leafhoppers, **1954**, II, 35, unsuccessful, **1955**, II, 40. Further cross-infection tests with clover, using dodder and leafhoppers, **1957**, II, 25; IV, 162, gave negative results, **1958**, II, 28. Two hop test-plants became infected after being infested with heafhoppers from the vicinity of a persistent nettlehead outbreak. No evidence of soil transmission by nematodes, **1959**, II, 28.

Newburgh — raspberry variety, highly virus-resistant or tolerant, **1957**, III, 64.

New Zealand — **Fruit growing in Australia and New Zealand,** by W. S. Rogers, **1959**, IV, 118.

Nickel toxicity, hops — *see under* Nettlehead, in relation to nickel content of hop plants.

Nicotine — *see under* Apple sawfly; Beneficial insects and mites, predators, fruit tree red spider mite.

Nightshade, black — *see under* Verticillium wilt, hops, weed hosts.

Nitro-chalk — *see under* Manuring, apples; —, cherries.

Nitrogen — *see under* Gloeosporium rots, orchard factors, manuring and soil management; Irrigation, apples; —, black currants; Manuring; Mineral composition, apple plants; Mineral deficiencies, nitrogen; Mineral nutrition, nitrogen; Soil management; Soil nitrogen level; Soil properties.

Norfolk Giant — *see under* Raspberry tasting trials; Raspberry varieties.

Northern Spy — used as rootstock for apples in Australia and New Zealand, **1959**, IV, 118.

,, winter moth (*Operophtera fagata*) — notes on, **1955**, III, 143.

Notocelia uddmanniana — *see under* Bramble shoot moth.

Nuclear Stock, strawberries — *see under* Strawberries, Nuclear Stock.

Nucleic acid — notes on, **1957**, III, 38.

Nurseries and stoolbeds, Experimental Farm — acreage, cropping, and general notes, **1954**, I, 18; **1955**, I, 21; **1956**, I, 6; **1957**, I, 3; **1958**, I, 5; **1959**, I, 4; **1960**, I, 5; **1961**, I, 5.

Nursery land — *see under* Replant problem.

Nutrient spraying — *see under* Mineral nutrition, nutrient spraying.

Nutritional studies — *see under* Mineral nutrition.

Oat-apple aphid — *see under* Apple-grass aphid.

Oats — *see under* Corn crops and trials.

Oil-emulsion sprays — *see under* Apple mildew, field trials.

Ontario — *see under* Virus diseases, heat treatment, plums.

Open-centre method — *see under* Tree shaping, apples.

Operophtera brumata — *see under* Winter moth.

Operophtera fagata — *see under* Northern winter moth.

Orchard(s), Experimental — *see under* Farm, Experimental, reports.

,, fauna — *see under* Insect fauna.

Organic analysis — *see under* Analysis, chemical, organic.

Organophosphorus compounds — *see under* Azinphos-methyl; Demeton-methyl; Dimethoate; Eelworms, leaf and bud; —, stem and bud; Insect fauna; Malathion; Mevinphos; Parathion; Phenkapton.

Orthosia incerta — *see under* Clouded drab moth.

Otiorrhynchus singularis — *see under* Clay-coloured weevil.

Oullins Golden Gage — *see under* Incompatibility, plums.

Ovicides — *see under* Acaricides; Fruit tree red spider mite, field trials; Insect fauna.

Oxypleurites neglectus — *see under* Mites, Phytoptid.

Pale brindled beauty moth (*Phigalis pilosaria*) — notes on, **1955**, III, 144.

Pammene rhediella — *see under* Fruitlet mining tortrix.

Parathion — *see under* Apple sawfly; Beneficial insects and mites, fruit tree red spider mite; Insect fauna.

Parthenocarpic fruit — *see under* Frost damage investigations, apples; — — —, pears.

PCBS (fenson) — *see under* Acaricides.

Peas, Experimental Farm — acreage, cropping, and general notes, **1954**, I, 18; **1955**, I, 21; **1956**, I, 6; **1957**, I, 3; **1958**, I, 4; **1959**, I, 4; **1960**, I, 4; **1961**, I, 5.

Peach(es)–

- Experimental Farm — acreage, cropping, and general notes, **1954**, I, 16.
- frost damage investigations — *see under* Frost damage investigations, peaches.
- green mottle virus — *see also under* Stem pitting virus; Virus diseases, heat treatment, plums.
  a virus latent in Lord Lambourne and M.IX caused green mottle symptoms on peach, **1956**, II, 27.
- growing, in France — notes on, **1961**, IV, 128.
- incompatibility — *see under* Incompatibility, peaches.
- indicator plants — *see under* Virus diseases, indicator plants, apples.
- leaf curl (*Taphrina deformans*) — effectively controlled by lime-sulphur applied when the buds are swelling, **1958**, III, 103.
- rootstocks — *see under* Rootstocks, peach; Incompatibility, peaches.
- varieties — notes on, **1955**, II, 27; **1959**, II, 8.
- virus diseases — *see under* Peach green mottle virus; Virus diseases, heat treatment, plums.

Pear(s)–

- -apple hybrids — *see under* Breeding, top fruits, apple-pear hybrids.
- on apple rootstocks — *see under* Incompatibility, pears, on apple rootstocks.
- bacterial blossom wilt — *see under* Blossom wilt, pears.
- bark canker — *see under* Bark canker, pears.
- ,, necrosis — *see under* Bark necrosis virus.
- biennial bearing — *see under* Pear cropping.
- blister canker — notes on, **1959**, II, 27. **Pear blister canker: a virus disease**, by R. Cropley; the virus was transmitted by grafting from a symptomless tree of Beurré Hardy to Williams' Bon Chrétien, causing slight

Pear(s)–blister canker–*continued*

epinasty of the leaves in the year after budding, and blister cankers, phloem necrosis and sometimes death the following year, **1959**, III, 104.

'blossom condition' — appears to be a feature of the tree itself; smaller, weaker blossoms characteristic of some years apparently less liable to set than the larger ones, **1958**, IV, 145.

blossom wilt — *see under* Blossom wilt, pears.

blossoming periods — *see under* Blossoming periods.

breeding — *see under* Breeding, top fruits, pears; —, top fruits, rootstocks, pear/quince hybrids.

bulk harvesting — *see under* Bulk harvesting.

cankers — *see under* Bark canker, pears; Fire-blight disease of pear; Pear blister canker.

cropping — *see also under* Pears, Experimental Farm.
Irregular cropping of pears, by W. S. Rogers and G. A. Booth; frost, wind, and spray damage are major factors, while others include lack of pollination, bird damage, and scion rooting, **1958**, IV, 143.

double-working — *see under* Double-working, double-shield budding.

Experimental Farm — acreage, cropping, and general notes, **1954**, I, 15; **1955**, I, 18; **1956**, I, 3; **1957**, I, 1; **1958**, I, 2; **1959**, I, 1; **1960**, I, 2; **1961**, I, 2.

fire-blight disease — *see under* Fire-blight disease of pear.

frost damage investigations — *see under* Frost damage investigations, pears.

fruit development — *see under* Fruit development, pears.

,, drop — *see under* Fruit drop, pears.

,, set — *see under* Fruit set, pears.

growing — *see under* Fruit growing.

incompatibility — *see under* Incompatibility, pears.

leaf midge (*Dasyneura pyri*) — notes on, **1958**, IV, 146.

manuring — *see under* Manuring, pears.

phloem necrosis — *see under* Pear blister canker.

pollination — notes on, **1958**, IV, 144.

propagation — *see under* Propagation, pears.

pruning — *see under* Pruning, pears.

-quince hybrids — *see under* Breeding, top fruits, rootstocks, pear-quince hybrids.

rootstocks — *see under* Incompatibility, pears; Rootstocks, pear.

russeting — *see under* Skin finish, pears; Spray damage investigations, pears.

sawfly (*Hoplocampa brevis*) — notes on, **1954**, II, 38. Observations on, **1954**, III, 134.

scab (*Venturia pirina*)– — *see also under* Farm, Experimental, reports.

culture techniques — notes on, **1954**, II, 33, 34; **1955**, II, 37; **1956**, II, 25; **1957**, II, 22; **1959**, II, 23; **1960**, II, 25.

field trials — trial started comparing hydraulic with concentrate sprays of lime-sulphur and captan respectively, **1956**, II, 29. Dilute hydraulic sprays more effective than concentrates on Williams' Bon Chrétien, and captan safer than sulphur, especially on Doyenné du Comice, **1959**, II, 26. Colloidal sulphur applied as a concentrate caused severe russeting of Comice, **1960**, II, 28; captan at all concentrations gave a much better skin finish, **1960**, II, 28; **1961**, II, 29.

host-parasite relations — notes on various extracts of pear leaves and glasshouse tests for inhibition, **1954**, II, 33, 34; **1955**, II, 36, 37; **1959**, II, 17, 23; **1960**,

Pear(s)–scab (*Venturia pirina*)–host-parasite relations–*continued*
II, 25; **1961**, II, 25. Cinnamic acid applied as a low-volume spray at 0·2% effective, **1956**, II, 25; **1957**, II, 22.
scion rooting — notes on, **1958**, IV, 146.
silver leaf — *see under* Silver leaf, pears.
skin finish — *see under* Skin finish, pears.
spray damage — *see under* Spray damage investigations, pears.
strains — **A selection of Williams' Bon Chrétien pear compatible with quince rootstocks**, by A. F. Posnette and R. Cropley, **1958**, III, 91.
sucker (*Psylla pyricola*) — notes on, **1954**, II, 38; **1955**, II, 44; **1956**, II, 31; **1958**, IV, 146; **1961**, I, 4. Observations on, **1955**, III, 132; **1957**, III, 135; **1958**, III, 120. **A contribution to the biology of the pear sucker, *Psylla pyricola***, by M. B. Georgala, **1956**, III, 135.
vein yellows — *see under* Vein yellows, pears.
virus diseases — *see under* Bark canker, pears; Bark necrosis virus; Chlorotic leaf spot virus; Pear blister canker; Quince stunt virus; Rubbery wood virus; Vein yellows, pears; Virus diseases, heat treatment, pears; — —, indicator plants, pears.
some common viruses such as vein yellows reduced the growth of 4-year-old trees by nearly 50%, **1961**, II, 29.
virus-tested — *see under* Mother Tree Scheme.
weedkillers — *see under* Weedkillers, top fruit.
Pentatrichopus fragaefolii — *see under* Strawberry aphid.
Pershore (*syn.* P. Yellow Egg) — *see under* Rootstocks, plum; Stem-building, plums.
Petrobia latens — *see under* Mites, Bryobia mite strains.
Petroleum-oil emulsion — *see under* Apple mildew, field trials.
pH, soil — *see under* Soil pH.
Phages — *see under* Bacteriophages.
Phenkapton — *see under* Acaracides, persistence; Fruit tree red spider mite, field trials.
Phenylmercuric chloride — *see under* PMC.
Phigalis pilosaria — *see under* Pale brindled beauty moth.
Phloem–
anatomy — *see under* Histological investigations; Incompatibility, pears, on quince rootstocks.
necrosis, pears — *see under* Pear blister canker.
Phloridzin — *see under* Analysis, chemical, organic, fruit plants; Apple scab, host-parasite relations; Coleoptile assay method; Growth substances; Pear scab, host-parasite relations; Soil residues, phloridzin.
Phorodon humuli — *see under* Damson-hop aphid.
Phosdrin (mevinphos) — *see under* Apple-grass aphid; Apple sucker; Rosy apple aphid.
Phosphorus — *see under* Functional disorders, core flush; Mineral composition, apple plants; Mineral deficiencies, phosphorus; Soil properties.
Photometer– — **A photometer for estimating the area of samples of detached leaves**, by D. H. Maggs, **1956**, III, 107.
,, , flame — *see under* Analysis spectrographic.
Photosynthesis–
effect of shade — *see under* Light intensity.
in relation to plant density — **The limit of plant productivity**, by Prof. G. E. Blackman, **1961**, III, 39.

Photosynthesis–*continued*

rate of CO_2 uptake — notes on method of measurement, using individual leaves, **1956**, II, 19; **1958**, II, 16; **1959**, II, 15; **1960**, II, 17. Net CO_2 uptake reduced on leaves bronzed by the fruit tree red spider mite, **1959**, II, 15.

Phyllobius spp. — *see under* Green leaf weevils.

Phytophthora cactorum — *see under* Collar rot, apples.

Phytoptid mites — *see under* Mites, Phytoptid.

Phytoptus ribis — *see under* Black currant gall mite.

Phytotoxicity — *see under* Spray damage investigations.

Pimply bark, apples — *see under* Bark injury investigations, apples.

Pitfall trapping — *see under* Insect catching/counting.

Plant analysis — *see under* Analysis; Mineral composition, apple plants.

,, Analysis Section — general review of research work, **1956**, II, 24; **1957**, II, 20; **1958**, II, 23; **1959**, II, 21; subsequently (**1960**, II, 20; **1961**, II, 20) included in Fruit Nutrition Section

,, cuticle — **The plant cuticle: its structure and relation to spraying problems**, by J. T. Martin, **1960**, III, 40.

Plantations, Experimental — *see under* Farm, Experimental, reports.

Planting(s) — on Experimental Farm, **1954**, I, 17; **1955**, I, 19; **1956**, I, 4; **1957**, I, 2; **1958**, I, 3; **1959**, I, 2; **1960**, I, 3; **1961**, I, 3.

Plant Pathology Section — general review of research work, **1954**, II, 34; **1955**, II, 37; **1956**, II, 25; **1957**, II, 22; **1958**, II, 25; **1959**, II, 23; **1960**, II, 24; **1961**, II, 24.

,, Physiology Section — general review of research work, **1954**, II, 30; **1955**, II, 33; **1956**, II, 18; **1957**, II, 14; **1958**, II, 15; **1959**, II, 14; **1960**, II 15; **1961**, II, 16.

,, Protective Chemistry Section — general review of research work, **1954**, II, 41; **1955**, II, 47; **1956**, II, 35; **1957**, II, 32; **1958**, II, 35; **1959**, II, 34; **1960**, II, 35; **1961**, II, 35.

Plesiocoris rugicollis — *see under* Apple capsid.

Plum(s)–

aphids — *see under* Leaf curling plum aphid.

bacterial canker — *see under* Bacterial canker, plums.

bark split — *see under* Bark split, plums.

blossoming — *see under* Blossoming periods.

branch breakage — *see under* Tree form, plums.

cambium miner — *see under* Cambium miner.

cropping — *see under* Plums, Experimental Farm; Plum varieties; Rootstocks, plum.

crotch angles — *see under* Tree shaping, plums.

dieback — *see under* Bacterial canker, plums.

Experimental Farm — acreage, cropping, and general notes, **1954**, I, 16; **1955**, I, 18; **1956**, I, 4; **1957**, I, 1; **1958**, I, 2, 3; **1959**, I, 2; **1960**, I, 2; **1961**, I, 2.

fruit splitting — *see under* Fruit splitting, plums.

growth substances — *see under* Growth substances.

high working — *see under* Propagation, plums, height of working; Stem-building, plums.

incompatibility — *see under* Incompatibility, plums.

leaf curling aphid — *see under* Leaf curling plum aphid.

Plum(s)–*continued*

line pattern — *see under* Line pattern virus, plums.

manuring — *see under* Manuring, plums.

marketing — *see under* Marketing, fruit.

necrotic ringspot virus — *see under* Virus diseases, indicator plants, plums.

pox — a virus producing fruit symptoms resembling 'plum pox' was transmitted by grafting to Warwickshire Drooper, **1959**, II, 27; **1960**, II, 29.

propagation — *see under* Propagation, plums.

prune dwarf virus — *see under* Plums, virus diseases.

pruning — *see under* Pruning, plums; Tree form, plums.

ring spot virus — *see under* Plums, virus diseases.

rootstocks — *see under* Rootstocks, plum.

sawfly (*Hoplocampa flava*) — observations on, **1956**, III, 131.

silver leaf — *see under* Silver leaf, plums.

spray damage — *see under* Spray damage investigations, plums.

stem-building — *see under* Stem-building, plums.

stunt virus — *see under* Plums, virus diseases.

summer pruning — *see under* Tree form, plums.

tree form — *see under* Tree form, plums.

,, shaping — *see under* Tree shaping, plums.

varieties — notes on cropping, **1954**, II, 23; **1955**, II, 27; **1956**, II, 12; **1957**, II, 8; **1959**, II, 8; **1960**, II, 10; **1961**, II, 10.

virus diseases — *see also under* Bark split; Virus diseases, heat treatment, plums; — —, indicator plants, plums.
trial planted to investigate effect of prune dwarf, line pattern, bark split, ring spot, and stunt viruses on the growth and cropping of four varieties, **1957**, II, 24; prune dwarf virus has severely checked growth of Oullins Golden Gage and markedly reduced crop of Victoria and Marjorie's Seedling, **1961**, II, 29.

virus-tested — *see under* Mother Tree Scheme.

PMC (phenylmercuric chloride) — *see under* Apple scab, ascospore production; — —, field trials; Fungicide testing, glass-slide method; Gloeosporium diseases, spore production; Gloeosporium rots, sprays/dips; Harvest residues, apples; Spray damage investigations, apples; — — —, pears.

Podosphaera leucotricha — *see under* Apple mildew.

Pollination, pears — notes on, **1958**, IV, 144.

Polyphenols — *see under* Apple scab, host-parasite relations; Pear scab, host-parasite relations.

Polythene bud-ties — *see under* Propagation, budding ties.

,, sheets — notes on effects of black polythene sheets laid between strawberry rows, **1960**, IV, 128.

Pomology Section — general review of research work, **1954**, II, 20; **1955**, II, 23; **1956**, II, 9; **1957**, II, 5; **1958**, II, 7; **1959**, II, 6; **1960**, II, 7; **1961**, II, 7.

Potassium — *see under* Functional disorders, core flush; — —, internal breakdown; — —, low temperature breakdown; Gloeosporium rots, orchard factors, manuring and soil management; Mineral composition, apple plants; Mineral deficiencies, potassium; Mineral nutrition, magnesium and potassium; — —, nitrogen and potassium; Skin finish, apples, general; Soil properties.

Potato(es)–

aphid (*Macrosiphum euphorbiae*) — *see also under* Hop mosaic, virus vector studies; Line pattern virus, hops.
observations on, **1957**, III, 135.

Experimental Farm — acreage, cropping, and general notes, **1954**, I, 18; **1955**, I, 20; **1956**, I, 6; **1957**, I, 3; **1958**, I, 4; **1959**, I, 4; **1960**, I, 4; **1961**, I, 4.

Powdery mildews — *see under* Fungicide testing, powdery mildews; and the name of the host.

Pratylenchus penetrans — *see under* Eelworms, soil migratory.

Predatory insects and mites — *see under* Beneficial insects and mites, predators.

President — *see under* Incompatibility, plums.

Promise — *see under* Raspberry tasting trials; Raspberry varieties.

Propagation–

apples– — *see also under* Double-working, interstocks, apple; Propagation, budding; —, rootstocks, apple; —, source factors; —, sphaeroblast shoots.

height of budding — *see also under* Root anchorage, apple rootstocks.
Higher budding of apple rootstocks, by N. G. Smith and W. S. Rogers; budding Cox at 9 or 12 in. above ground level gave an equally good 'take' of buds as budding at 6 in., and resulted in taller maiden trees. Budding at 12 in. is recommended, as it will eliminate scion rooting and avoid infection with collar rot, **1960**, III, 49.

irregular bud-break — *see also under* Propagation, apples, time of budding.
budded trees of Lord Lambourne and Fortune on M.26 showed irregular bud-break, but buds of Cox, Worcester and Laxton's Superb grew regularly and well, **1958**, II, 7.

time of budding — M.26 should be budded in August rather than July, avoiding thick rootstocks, **1959**, II, 7. Swelling of rootstock greater when budded in mid-July rather than late August, and increased risk of constriction by the tie, **1960**, II, 8. **Delayed growth of apple scions in relation to early budding, bud constriction and some other factors**, by N. G. Smith, R. J. Garner and W. S. Rogers; delayed growth of maiden apples, mainly due to greatly increased constriction of buds by the tie, resulted when budding was done early (end July) and was followed by rapid growth of the rootstock; care should be taken to release ties before they are too tight, or to use ties which are either very elastic or give way under strain, **1961**, III, 51.

blackberries — notes on propagation (by tip-layering and leaf-bud cuttings) of virus-tested clones, **1956**, II, 13; **1957**, II, 9; **1958**, II, 10; **1959**, II, 9; **1960**, II, 10; **1961**, II, 11.

black currants — **A comparison of black currant cuttings from stooled plants and fruiting bushes**, by R. J. Garner, E. S. J. Hatcher and R. W. Kemp; the material from stools was easier to collect, and rooted and grew as well or better than that from fruiting bushes, **1955**, III, 61.

budding– — *see also under* Double-working, double-shield budding; Propagation, apples.

„ techniques — neither the use of petroleum jelly smears nor the removal of the wood from the bud-shield has a detrimental effect on bud-break or growth, **1961**, III, 52.

„ ties — comparison of polythene tape 1 in. wide and 0·0025 in. thick and P.V.C. ribbed strips $\frac{3}{16}$ in. wide and 0·036 in. total thickness; stretching of the polythene varied, under different conditions, from

Propagation–budding ties–*continued*
nearly four times that of the P.V.C. to about the same as the P.V.C., **1961**, III, 54.
cherries — *see under* Double-working, interstocks, cherry; Tree form, cherries.
disc cuttings — *see under* Propagation, strawberries.
double-shield budding — *see under* Double-working, double-shield budding.
hardwood cuttings — *see under* Propagation, black currants; —, rootstocks, hardwood cuttings; —, sphaeroblast shoots.
layering — *see under* Propagation, blackberries; —, loganberries; —, raspberries.
leaf-bud cuttings — *see under* Propagation, blackberries; —, raspberries.
loganberries — notes on propagation (by tip-layering) of virus-tested clones, **1956**, II, 13; **1957**, II, 9; **1958**, II, 10; **1959**, II, 9.
pears — *see under* Double-working, double-shield budding; Incompatibility, pears.
plums– — *see also under* Propagation, rootstocks, hardwood cuttings, winter storage.
height of working — trial planted with Ontario worked high (4 ft. 6 in.) and low (5 in.) on Myrobalan B, **1957**, II, 5.
raspberries — *see under* Genetical studies, general.
root cuttings — *see under* Propagation, rootstocks, root cuttings.
rootstocks–
apple — *see under* Propagation, rootstocks, hardwood cuttings; —, —, root cuttings; —, —, softwood cuttings; —, sphaeroblast shoots.
cherry — *see also under* Propagation, rootstocks, root cuttings.
notes on methods of propagation and nursery behaviour of a number of *Prunus* spp., **1956**, III, 66.
hardwood cuttings– — *see also under* Propagation, sphaeroblast shoots.
source factors — **Rootstock effect on the regeneration of apple cuttings**, by R. J. Garner and E. S. J. Hatcher; cuttings from hedge plants on vigorous rootstocks established better than those from hedges on dwarfing stocks, **1956**, III, 60. Beneficial effect on rooting of cuttings following combined stem and root pruning of the Crab C source trees, **1958**, II, 17.
winter storage — notes on, **1954**, II, 31; **1955**, II, 34; **1956**, II, 11, 19; **1957**, II, 15; **1958**, II, 8, 17. **Aspects of rootstock propagation. IV. The winter storage of hardwood cuttings,** by E. S. J. Hatcher and R. J. Garner; hedge cuttings, taken from late October to mid-November, are given a quick dip in alcoholic indole-butyric acid solution, and stored through the winter in a peat-sand mixture with a controlled minimum temperature of 45° F; for plums, a dip containing ½ mg IBA per ml 50% alcohol is recommended, and for apples 2½ mg IBA per ml. A storage unit is described and its practical advantages discussed, **1956**, III, 101.
Direct lining out of cuttings (18 in. long and over), budded in the same year; successful with Myrobalan B and Brompton, but not with M.26 and MM.104, **1960**, II, 8; **1961**, II, 8. Cuttings up to 24 in. long successful, **1961**, II, 8.
pear — *see under* Propagation, rootstocks, root cuttings.
plum — *see under* Propagation, rootstocks, hardwood cuttings, winter storage.
root cuttings — *see also under* Propagation, source factors.
Aspects of rootstock propagation. III. Experiments with root cuttings, by D. W. Way, E. S. J. Hatcher, and R. J. Garner; exposure of the upper end of root cuttings of apple, pear, and cherry under glass

Propagation–rootstocks–root cuttings–*continued*

and in open soil compared with burial, and effects of varying the size and source of the cuttings. Growth substance treatment had no effect. The shorter the cutting the lower the rooting percentage, and 5 in. suggested as the best compromise, **1954**, III, 67. **Aspects of rootstock propagation. V. The behaviour of root cuttings from plants of different age of establishment**, by R. J. Garner and E. S. J. Hatcher; both rooting and growth of root cuttings of Crab C declined with increasing age of establishment of the parent plant; effect of variations in size of cuttings only moderate. Three- or four-year parents the most suitable source of cuttings for nursery purposes, **1957**, III, 57.

softwood cuttings — notes on mist propagation, **1958**, II, 8, 17. **Mist propagation frames for leafy cuttings**, by S. M. Singh, W. S. Rogers and C. H. W. Slater; with softwood cuttings of apple rootstocks, over 90% rooted successfully under mist; equal parts of coarse sand and peat is a suitable medium, and partial shading greatly benefits rooting. Rooted cuttings must be gradually hardened off before transference to the nursery, **1956**, III, 54. Rooting the cutting is fairly easy, but growth is meagre in the year of rooting and a second year in the nursery is needed, **1959**, II, 7. Long (16 in.) cuttings of M.26 rooted well under mist, and were transferred to the open nursery under sprinklers, **1960**, II, 8; they over-wintered variably, and in general establishment and growth were inadequate, **1961**, II, 8.

source factors — *see also under* Propagation; black currants; —, rootstocks, hardwood cuttings, source factors; —, —, root cuttings.
The effect of the original situation of the scion on its subsequent growth, by D. H. Maggs; distribution of differing growth potentials of buds taken from different positions along the bud-stick and worked on to selected rootstocks appears to be irregular, **1958**, III, 83. **Delayed flowering of trees raised from adventitious scions**, by R. J. Garner and E. S. J. Hatcher; scions of adventitious origin (from sphaeroblasts or root cuttings) form trees that are delayed in their flowering, a characteristic associated with enhanced regeneration potential, **1960**, III, 52. **Delayed growth of apple scions in relation to early budding, bud constriction and some other factors**, by N. G. Smith, R. J. Garner and W. S. Rogers; the position which a bud occupies on the bud-stick will have no influence on the growth it will make after budding, provided the bud is plump and is not removed from the softer terminal part of the shoot, **1961**, III, 51.

sphaeroblast shoots — *see also under* Propagation, source factors.
The production of sphaeroblast shoots of apple for cuttings, by E. S. J. Hatcher and R. J. Garner; sphaeroblasts were produced on Crab C by pruning and completely disbudding maiden and two-year nursery trees; the optimum time for disbudding was towards the end of the dormant season. Sufficient growth was made by the second season to yield some twenty-five hardwood cuttings per tree, **1954**, III, 73. **The compatibility and growth of pear scions on apple rootstocks**, by R. J. Garner and Catherine P. Nicoll; the degree of sphaeroblast production on the rootstocks was correlated with increased incompatibility, **1960**, III, 54.

strawberries — use of 0·5–1 cm. disc cuttings in a rooting medium of peat, sand, or a mixture of both, for propagating healthy plants following heat-treatment, **1959**, III, 98.

time of budding — *see under* Propagation, apples.

virus-tested clones — *see under* Mother Tree Scheme; Propagation, blackberries; —, loganberries.

Propham — *see under* Weedkillers, strawberries.

Prophylls — basal bud-scales with a crescentic lamina; notes on development, **1961**, III, 71.

Prune dwarf virus — *see under* Plums, virus diseases.

Pruning–

apples– — *see also under* Deblossoming, apples; Fruit drop, apples; Fruit set, apples; Fruit size, apples; Gloeosporium rots, orchard factors, pruning; Growth analysis, pruning effect; Hail damage; Histological investigations, apple rootstocks, general; Tree form, apples; Tree shaping, apples; Tree size, apples; Wind damage.

established-spur system — description of method, **1959**, IV, 122. In pruning trials it was too severe for Cox and Worcester, but Laxton's Superb trees pruned on this system yielded at least as heavily as the regulated and renewal-pruned trees, and were less biennial, **1959**, IV, 126.

general — **Pruning trials with dessert apples,** by A. P. Preston; describes the results of trials with Cox, Laxton's Superb and Worcester Pearmain up to the fifteenth year, **1959**, IV, 122. Comparison begun between pruning in alternate years and annual pruning on trees of Cox and Laxton's Superb in the pruning trial, **1960**, II, 9.

regulated system — description of method, **1959**, IV, 122. In pruning trials, regulated-pruned trees of Worcester and Cox at 7 years had yielded respectively twice and four times as heavily as the established-spur pruned trees, **1959**, IV, 123.

renewal system — description of method, **1959**, IV, 122. In pruning trials renewal-pruned trees of Cox at 7 years had yielded twice as heavily as the established-spur pruned trees, **1959**, IV, 123.

black currants — **Pruning trials with black currants**, by A. P. Preston; results of two trials; (i) comparing two methods of spacing and pruning, and (ii) comparing two times of pruning; bushes pruned immediately after picking gave a 12% higher yield than those that were winter pruned, **1954**, III, 82. New trial comparing hard and light pruning, summer and winter, **1959**, **II**, 9.
In irrigation trial, immediate effect of superimposing orthodox pruning on previously unpruned bushes was to reduce the crop by 50%, **1960**, II, 21. Pruning reduced the crop by about 40% irrespective of water treatments, even though it increased berry size by about 22%, **1961**, II, 20.

pears — pruning trial planted, **1957**, II, 7; unpruned trees of Comice on Quince A yielded a few fruits at 2 years old, **1958**, II, 8. Notes on the 'multiple central leader' system used in the Hawke's Bay area of New Zealand, **1959**, IV, 120. Pruning trial started comparing the Hawke's Bay system with established spur and renewal pruning methods, **1961**, II, 9.

plums — *see also under* Tree form, plums.
in trial with Victoria on Brompton, now 6 years old, unpruned trees again cropped more heavily than either of the two pruning treatments, **1954**, II, 23; differences due to pruning in the first three years now much smaller, **1955**, II, 26.

Prunus avium — *see under* Breeding, top fruits, rootstocks, cherry; Rootstocks, cherry.

,, *cerasifera* — *see under* Myrobalan B.

,, *cerasus* — *see under* Rootstocks, cherry, general.

,, *mahaleb* — *see under* Rootstocks, cherry, general.

,, *serrulata* — *see under* Virus diseases, indicator plants, cherries.

,, spp. — *see under* Rootstocks, cherry, general.

Psallus ambiguus — *see under* Beneficial insects and mites, predators, fruit tree red spider mite.

Pseudomonas mors-prunorum — *see under* Bacterial canker; Bacteriophages.

,, *syringae* (syn. *Ps. prunicola*) — *see also under* Bacteriophages; Blossom wilt, pears.
method of distinguishing from *Ps. mors-prunorum*, **1955**, III, 121.

Pseudophonus rufipes (syn. *Harpalus rufipes*) — *see under* Ground beetles, strawberries.

Psylla mali — *see under* Apple sucker.

,, *pyricola* — *see under* Pear sucker.

Pteronidea ribesii — *see under* Common gooseberry sawfly.

P.V.C. bud-ties — *see under* Propagation, budding ties.

,, gauze — *see under* Glasshouses, Experimental Farm.

Pyracantha spp. — *see under* Fire-blight disease of pear, general.

Pyronia veitchii luxemburgiana — *see under* Breeding, top fruits, rootstocks, pear-quince hybrids.

Pyrus calleryana — *see under* Incompatibility, pears; Rootstocks, pear, general.

Pythium ultimum — *see under* Mycorrhiza.

Quince–

A, B, and C — *see under* Rootstocks, pear.

bark necrosis virus — *see under* Virus diseases, heat treatment, general; — —, indicator plants, pears.

indicator plants — *see under* Virus diseases, indicator plants, pears.

mildew (*Podosphaera leucotricha*) — notes on selection of resistant seedlings, **1960**, II, 28.

-pear hybrids — *see under* Breeding, top fruits, rootstocks, pear-quince hybrids.

rootstocks — *see under* Rootstocks, pear.

stunt virus — *see also under* Virus diseases, heat treatment, general.
transmitted to apple seedlings, on which it caused no symptoms, **1957**, II, 24.

verticillium — *see under* Verticillium, quinces.

virus diseases — *see under* Quince stunt virus; Virus diseases, heat treatment, general; — —, indicator plants, pears.

Raspberry(ies)–

beetle (*Byturus tomentosus*) — *see also under* Spraying programme.
observations on, **1955**, III, 131. On loganberry, controlled effectively by a single spray of 0·05% malathion, or of 0·02% dimethoate, applied when the first fruit was colouring, **1960**, II, 32. 0·05% malathion has a strong ovicidal action, **1961**, II, 33.

botrytis — *see under* Raspberry dieback.

breeding — *see under* Breeding, soft fruits; Raspberries, resistance to Rubus aphid.

cane midge — *see under* Spraying programme.

cane spot (*Elsinoë veneta*) — *see under* Cane spot, raspberries.

cropping — *see under* Raspberries, Experimental Farm; Raspberry varieties.

cultural trials — *see under* Soil management, raspberries, straw mulch.

dieback (*Botrytis cinerea*) — Lloyd George most resistant variety, Promise and Norfolk Giant most susceptible, **1956**, II, 13; **1957**, II, 8. Marked reduction of incidence on hairy-caned varieties, **1957**, III, 64.

Enterprise — *see under* Raspberry tasting trials; Raspberry varieties.

Raspberry(ies)–*continued*

Experimental Farm — acreage, cropping, and general notes, **1954**, I, 16; **1955**, I, 18; **1956**, I, 4; **1957**, I, 2; **1958**, I, 2; **1959**, I, 2; **1960**, I, 2; **1961**, I, 2.

Exploit — *see under* Irrigation, raspberries; Raspberry varieties; Soil management, raspberries, straw mulch.

frost damage — *see under* Frost damage investigations, raspberries.

harvest residues — *see under* Harvest residues, raspberries.

irrigation — *see under* Irrigation, raspberries.

Jewel — *see under* Irrigation, raspberries; Raspberry varieties; Soil management, raspberries, straw mulch.

Landmark — *see under* Raspberry tasting trials.

Lloyd George — *see under* Raspberry varieties.

marketing — *see under* Marketing, fruit.

mulching — *see under* Soil management, raspberries, straw mulch.

Newburgh — *see under* Raspberries, virus resistance.

Norfolk Giant — *see under* Raspberry tasting trials; Raspberry varieties.

Promise — *see under* Raspberry tasting trials; Raspberry varieties.

propagation — *see under* Genetical studies, general.

resistance to Rubus aphid — *see also under* Breeding, soft fruits; Rubus aphid.
notes on, **1956**, II, 32; **1957**, II, 30; **1958**, II, 32; **1959**, II, 32; **1960**, II, 33; **1961**, II, 33. Baumforth A being used in breeding work as main source of resistance, as well as *Rubus henryi*, **1957**, III, 63. **Methods for assessing resistance to *Amphorophora rubi* (Kalt.) in the raspberry**, by J. B. Briggs; describes techniques for forecasting resistance in raspberry varieties and seedlings in the insectary, and for comparing infestations on individual seedlings in the field, **1958**, III, 121.

ringspot virus — *see under* Cherry rasp leaf: Virus testing, cherries.

sawfly (*Empria tridens*) — observations on, **1954**, III, 134.

spray residues — *see under* Harvest residues, raspberries.

spur blight (*Didymella applanata*) — *see also under* Spraying programme.
Lloyd George relatively resistant, Malling Promise, Exploit and Enterprise heavily attacked, **1956**, II, 13; **1957**, II, 8.

straw mulching — *see under* Soil management, raspberries, straw mulch.

tasting trials — **Preliminary tasting trials with strawberries and raspberries**, by D. W. Way and G. H. Freeman; Malling Promise rated highest, Enterprise and Landmark intermediate, and Norfolk Giant lowest, **1954**, III, 96.

varieties — *see also under* Raspberries, Experimental Farm.
notes on cropping, **1954**, II, 24; **1955**, II, 27; **1956**, II, 13; **1957**, II, 8; **1958**, I, 2; **1959**, I, 2; **1960**, I, 2; **1961**, I, 2.

virus resistance — *see also under* Raspberries, resistance to Rubus aphid.
American variety Newburgh has shown high virus resistance or tolerance over a ten-year period at East Malling, **1957**, III, 64.

weedkillers — *see under* Weedkillers, raspberries.

yellow dwarf virus — *see under* Arabis mosaic virus.

Rasp leaf, cherries — *see under* Cherry rasp leaf.

Red currant(s) — *see under* Genetical studies, general.

,, spider mite (*Tetranychus urticae*) — *see also under* Hop mosaic, virus vector studies.
notes on, **1954**, III, 139; **1955**, III, 135.

Reeves Seedling — *see under* Incompatibility, plums.

Regulated pruning — *see under* Pruning, apples, regulated system.

Renewal pruning — *see under* Pruning, apples, renewal system.

Replant problem — *see also under* Eelworms, soil migratory, host-parasite relations; Soil residues, phloridzin.
The occurrence of areas of poor growth in a fruit tree nursery, by J. A. Thompson; poor growth on land previously occupied by related species, especially marked with apples but also with quinces, cherries, and some plums, **1958**, III, 80.

Research progress bulletins — *see under* Bulletins on progress in research.

,, Station land — *see under* History of Research Station land; Soil surveys.

Residues — *see under* Harvest residues; Soil residues.

Respiration rates — *see under* Photosynthesis, rate of CO_2 uptake.

Reversion — *see under* Black currant reversion.

Rhopalosiphum insertum — *see under* Apple-grass aphid.

Rhothane — *see under* Fruit tree tortrix moth.

Ribes–

breeding — *see under* Breeding, soft fruits.

virus diseases — *see under* Black currants, virus diseases.

Ring grafting — *see under* Incompatibility, peaches.

,, mottle, cherries — *see under* Cherries, virus diseases.

,, spot virus — *see under* Plums, virus diseases.

Rogor (dimethoate) — *see under* Apple-grass aphid; Apple sawfly; Apple sucker; Fruit tree red spider mite, field trials; Raspberry beetle; Rosy apple aphid; Woolly aphid, control.

Root anchorage, apple rootstocks — notes on, **1957**, II, 5; **1959**, II, 6. In rootstock trial MM.104 has given the best anchored trees, followed by M.XVI, M.XXV and M.II, **1958**, III, 48. Trial planted with Cox on M.VII budded at 6 in. and 12 in., and with all unions at 6 in. above soil level, with no stakes, **1960**, II, 8.

,, cuttings — *see under* Propagation, rootstocks, root cuttings.

,, excavations — notes on, **1954**, II, 22; **1955**, II, 25; **1957**, II, 7.

,, extracts — *see under* Growth substances.

,, growth — *see under* Growth analysis, roots; Root studies.

,, lesion eelworms — *see under* Eelworms, soil migratory.

,, observation laboratory — notes on, **1961**, II, 8.

Rootstocks– — *see also under* Propagation (appropriate sub-headings).

apple (Malling and Malling-Merton)– — *see also under* Breeding, top fruits, rootstocks, apple; Growth analysis, stock-scion interaction; Histological investigations, apple rootstocks; Root anchorage, apple rootstocks; Wind damage.

general — notes on, **1954**, II, 20; **1955**, II, 23; **1956**, II, 9; **1958**, II, 7; **1960**, II, 7. **Descriptions of the Malling apple rootstocks**, by H. M. Tydeman, **1954**, III, 64. **Malling 26: a new semi-dwarfing apple rootstock**, by W. S. Rogers; produces trees intermediate in size between M.IX and M.VII, **1957**, III, 48; released for general distribution, **1959**, II, 6. **Apple rootstock studies: growth and cropping of Cox's Orange Pippin on some Malling and Malling-Merton rootstocks**, by A. P. Preston; comparisons made at 13 years old, on loam and sand. MM.104 outstanding for cropping and anchorage, **1958**, III, 47. **Thirty-five years' results with some Malling clonal apple**

Rootstocks–apple (Malling and Malling-Merton)–general–*continued*

rootstocks, by A. P. Preston; gives the main results over a 35-year period for Lane's Prince Albert, Worcester and Cox on M.IX, M.VII, M.IV, M.I, M.II and M.XVI, **1958**, IV, 148. Severe damage from waterlogging on a number of the rootstock plots on different soils throughout the country; on these plots about 30% of the trees on MM.104 and MM.109 were affected, but less than 10% of those on MM.106, M.II, M.XVI, and M.XXV suffered damage. Cox much less damaged than Worcester, **1961**, II, 7. **The behaviour of fourteen clonal apple rootstocks in an exposed hill-top orchard**, by A. P. Preston; compares the growth and cropping of Cox, Jonathan and Ellison's Orange at 10 years, and of Cox and Jonathan at 15 years. Yields of Jonathan and Ellison's were much heavier than those of Cox, on this exposed site. With Cox, trees on MM.104, MM.106 and MM.109 gave the heaviest crops; with Jonathan, yields on MM.104 were relatively poor and on MM.106 and MM.109 outstanding, **1961**, III, 63.

resistance to collar rot — *see under* Collar rot, apples.

virus infection — *see also under* Virus diseases, indicator plants, apples.
recently discovered apple viruses, such as chlorotic leaf spot, epinasty and stem pitting have been found in all plants tested of the Malling rootstocks except M.XII, M.XVI, M.26 and Crab C; of the MM stocks, all the MM.109 and some of the MM.106 were infected, **1960**, II, 28; **1961**, IV, 126.

virus-tested — MM.104 and MM.111 apparently free of latent viruses, and used as rootstocks for apple Mother Trees; selected clones of M.II, M.IV, M.VII, M.IX and M.XVI free from mosaic, rubbery wood and chat fruit viruses being propagated, but of these re-selections only M.VIIa as yet available for distribution, **1961**, IV, 126.

breeding — *see under* Breeding, top fruits, rootstocks.

cherry– — *see also under* Breeding, top fruits, rootstocks, cherry.

general — **Observations on *Prunus cerasus, P. mahaleb* and other species as rootstocks for sweet cherries**, by R. J. Garner and Catherine P. Nicoll; cropping of sweet cherry varieties over a period of ten years was no better on other species than on sweet cherry rootstocks, and none of those tested were considered suitable as a dwarfing rootstock, **1956**, III, 63. Notes on trials with F1/3, F12/1, and F5/4, **1957**, II, 5; **1959**, II, 6.

virus-tested — virus-tested clone of F 12/1, apparently free from all viruses, recently made available to nurserymen, **1961**, IV, 127.

peach — *see under* Incompatibility, peaches.

pear– — *see also under* Breeding, top fruits, rootstocks, pear/quince hybrids; Incompatibility, pears.

general — *Pyrus calleryana.* Trees of Conference on *P. calleryana* in their fourth year have made less growth and fruited more heavily than those on Quince A, **1958**, II, 7.
Quince. **Thirty-six-year-old trees of Conference pear on Quince rootstocks**, by Dorothy J. Wilson; trees on Quince A and B have yielded respectively 39% and 37% higher than those on Quince C, **1956**, III, 91. Trial planted comparing quinces from various sources with Quince A, **1960**, II, 7.

virus-tested — virus-tested clone of Quince A, apparently free from all viruses, recently made available to nurserymen, **1961**, IV, 127.

plum– — *see also under* Incompatibility, peaches; —, plums; Virus diseases, heat treatment, plums.

Rootstocks–plum–*continued*

general — notes on, **1957**, II, 5; **1958**, II, 8. In trial with semi-dwarfing rootstocks Victoria has done well on all rootstocks except Ackermann's, and 9-year-old trees on Common Plum gave crops of 120 lb per tree, **1955**, II, 23; at 12 years, the heaviest crops were from trees on St. Julien A and Marianna, **1958**, II, 8, and at 15 years from trees on St. Julien A, **1961**, II, 7. **A description and classification of certain plum rootstocks**, by H. M. Tydeman, **1956**, III, 75. **Rootstocks for plums**, by Elizabeth M. Glenn; best selection consists of Myrobalan B for large trees, Pershore Yellow Egg for medium-sized ones, and St. Julien A for smaller ones, **1960**, IV, 130.

resistance to bacterial canker — in preliminary tests, 24 clones of seedlings of St. Julien of Orleans appear to be highly resistant or immune, **1960**, II, 24; confirmed after reinoculation, **1961**, II, 24. Susceptible varieties should be high-worked on to the resistant Myrobalan B, **1960**, IV, 130. In field trial Myrobalan B, Belgian Myrobalan and EA 16 were more resistant than Brompton, St. Julien A and EC3, those worked with Victoria developing larger cankers than those worked with Early Laxton, **1961**, II, 24.

propagation — *see under* Propagation, rootstocks.

quince — *see under* Rootstocks, pear.

resistant to–

bacterial canker — *see under* Breeding, top fruits, rootstocks, cherry; Rootstocks, plum, resistance to bacterial canker.

collar rot — *see under* Collar rot, apples.

woolly aphid — *see under* Histological investigations, apple rootstocks; Rootstocks, apple.

-scion interaction — *see under* Stock-scion interaction.

virus-tested — *see under* Rootstocks, apple, virus-tested; —, cherry, virus-tested; —, pear, virus-tested.

Root studies — *see also under* Growth analysis, roots.
notes on, **1959**, II, 7; **1960**, II, 8.

,, taper — *see under* Growth analysis, roots.

Rosy apple aphid (*Sappaphis mali*) — notes on control, **1961**, IV, 118.

,, leaf-curling aphid (*Sappaphis devecta*) — observations on, **1954**, III, 135. Notes on control, **1961**, IV, 118.

,, rustic moth (*Hydraecia micacea*, syn. *Gortyna micacea*) — observations on, **1957**, III, 134.

Rotylenchus sp. — *see under* Eelworms, soil migratory, general.

Royal Sovereign — *see under* Strawberries, Royal Sovereign.

Rubbery wood virus — *see also under* Apples, virus diseases; Virus diseases, heat treatment, general.
transmitted from several pear varieties to Lord Lambourne apple, **1961**, II, 29.

Rubus aphid (*Amphorophora rubi*) — *see under* Breeding, soft fruits; Raspberries, resistance to Rubus aphid.
notes on strains capable of overcoming the resistance conferred by certain of the genes used in raspberry breeding, **1958**, II, 32; **1959**, II, 32; **1960**, II, 33.

,, breeding — *see under* Breeding, soft fruits.

Rubus henryi — *see under* Raspberries, resistance to Rubus aphid; Virus diseases, indicator plants, loganberries.

Rubus idaeus — *see under* Genetical studies.

„ *occidentalis* — *see under* Genetical studies.

Rubus stunt virus — virus vector studies; notes on tests with leafhoppers (*Macropsis* spp.), **1957**, II, 35; **1959**, II, 32; **1960**, II, 33. Transmitted from diseased to healthy loganberry plants by *Macropsis fusculi* and from diseased to healthy blackberry by *M. scotti*, **1961**, II, 30.

„ virus diseases — *see under* Loganberries, virus diseases; Raspberries, resistance to Rubus aphid; Rubus stunt virus; Sudden wilt, blackberries.

Rugose mosaic, cherries — *see under* Cherries, virus diseases.

'Running off', black currants — *see under* Fruit set, black currants.

Russeting, fruit — *see under* Frost damage investigations, apples, symptoms of damage; Skin finish; Spray damage investigations.

Rusty mottle, cherries — *see under* Cherries, virus diseases; European rusty mottle.

Ryania — *see under* Codling moth, insecticide trials.

Ryegrass, perennial — *see under* Soil management, apples, grass sward; Soil management, cherries; Soil moisture studies.

St. Julien A — *see under* Rootstocks, plum.

Sampling, leaf — *see under* Mineral composition, apple plants.

„ methods — *see under* Statistical studies.

Sand culture — *see under* Mineral composition, apple plants; Mineral nutrition, magnesium and potassium; — —, nitrogen; — —, nitrogen and potassium.

Sappaphis devecta — *see under* Rosy leaf-curling aphid.

„ *mali* — *see under* Rosy apple aphid.

Sawflies — *see under* Apple sawfly; Pear sawfly.

Scab — *see under* Apple scab; Pear scab.

Scarce umber moth (*Erannis aurantiaria*) — notes on, **1955**, III, 143.

Scientific Liaison Section — general review of activities, **1954**, II, 44; **1955**, II, 50; **1956**, II, 38.

Scion(s)–

adventitious — *see under* Propagation, source factors.

apple, delayed growth — *see under* Propagation, apples, time of budding.

origin — *see under* Propagation, source factors.

rooting–

apples — *see under* Propagation, apples, height of budding.

pears — *see under* Pears, scion rooting.

-rootstock interaction — *see under* Stock-scion interaction.

varieties — *see under* Breeding, top fruits; Mother Tree Scheme.

Scolytus mali — *see under* Large fruit bark beetle.

Seabrook's Black — *see under* Black currant varieties; Fruit set, black currants.

Seedless fruit — *see under* Frost damage investigations, apples; — — —, pears.

Senecio vulgaris — *see under* Groundsel.

S.E.S. — *see under* Weedkillers, strawberries.

Sevin — *see under* Fruit thinning, apples; Fruit tree tortrix moth.

Shade — *see under* Light intensity.

Shield-budding — *see under* Double-working, double-shield budding.

Shoot growth — *see under* Growth analysis, shoots and stems; Statistical studies, apples.

Silver green leaf weevil (*Phyllobius argentatus*) — observations on, **1954**, III, 133.

,, leaf (*Stereum purpureum*)–

pears — widespread outbreak in the pear manurial trial at Efford, mainly in Conference, **1960**, II, 21.

plums– — *see also under* Tree form, plums.

general — notes on effects of spring and early summer injections with 8-hydroxyquinaline sulphate, **1954**, II, 37; **1955**, II, 41; **1956**, II, 29. After removing silvered branches from mature trees, it was noted that the fungus had already progressed into the trunk, **1961**, II, 27.

host-parasite relations — evidence of parasitic adaptation by different strains, **1960**, II, 26. *o*-Coumaric acid strongly inhibited growth of the fungus in culture, **1960**, II, 26, but had no effect on its development in young plum trees, **1961**, II, 27.

Simazine — *see under* Weedkillers, black currants; —, raspberries; —, strawberries; —, top fruit.

Sisalkraft paper — *see under* Frost damage investigations, strawberries, protective measures.

Skin finish– — *see also under* Spray damage investigations.

apples– — *see also under* Frost damage investigations, apples, symptoms of damage.

effect of sprays — in apple mildew trial, fruits sprayed with DNOPC at normal strength (0·025%) both alone and when added to half-strength captan (0·05%) had better skin finish than those sprayed with lime-sulphur, **1955**, II, 41. In fruit tree red spider mite trial, severe russeting and cracking of Cox resulted from a high-volume application of Kelthane at petal-fall, but not when made two weeks later, **1960**, II, 32; **1961**, II, 32. In apple scab trial, dodine acetate caused more russet on Cox than captan or thiram, **1961**, II, 29.

general — scions from twenty-four selected trees from various orchards grafted on to M.IX to test if differences in skin finish can be maintained, **1957**, II, 35. **Russeting and cracking of Cox's Orange Pippin apples**, by H. B. S. Montgomery; in classical manurial trial, cracking was worse on the clean cultivated plots, especially where nitrogen and potash were applied, **1958**, IV, 163. Notes on relation between the anatomy of the skin and tendency of the fruit to russet, **1960**, II, 9; **1961**, II, 10. Russeting and cracking of Cox increased by wet, humid weather, and apparently worse on poorly grown trees with an inadequate leaf cover, **1960**, II, 9.

pears — in pear scab experiment, captan was safer than sulphur sprays, especially on Comice, **1959**, II, 26; Comice fruits were severely russeted by colloidal sulphur applied as a concentrate; captan at all concentrations gave a much better skin finish, **1960**, II, 28.

Sodium arsenate — *see under* Spray damage investigations, apples.

,, cinnamate — *see under* Apple scab, host-parasite relations (**1959**, II, 26).

Soft fruits– — *see under* the individual fruits or the subject.

Experimental Farm — acreage, cropping, and general notes, **1954**, I, 16; **1955**, I, 18; **1956**, I, 4; **1957**, I, 2; **1958**, I, 2; **1959**, I, 2; **1960**, I, 2; **1961**, I, 2.

Softwood cuttings — *see under* Propagation, rootstocks, softwood cuttings.

Soil acidity/alkalinity — *see under* Soil pH.

,, analysis — *see under* Soil nitrogen level; Soil pH; Soil residues.

,, -borne diseases — *see under* Eelworms, soil migratory; Verticillium wilt, hops, soil relationships.

Soil compaction — *see under* Frost, soil conditions influencing incidence; Soil management, raspberries, straw mulch.

,, cover — *see under* Frost, soil conditions influencing incidence; Soil management; Soil moisture studies; Soil properties; Verticillium wilt, hops, soil relationships.

,, drainage — *see under* Frost, soil conditions influencing incidence.

,, fumigation — *see under* Eelworms, soil migratory, soil fumigation; Verticillium wilt, strawberries, soil fumigation.

,, management– — *see also under* Soil moisture studies; Soil nitrogen level; Soil properties.

apples– — *see also under* Functional disorders, apples; Gloeosporium rots, orchard factors, manuring and soil management; Leaf fall, apples; Manuring, apples; Skin finish, apples, general.

clean cultivation — *In soil management trial with Laxton's Superb,* the trees on the cultivated plots are noticeably more regular in cropping than the mulched or grass plots, but in 1957 they showed poor foliage and made little growth, **1957**, II, 19. Marked deterioration of the condition of the trees under clean cultivation, **1958**, II, 21.

grass sward — *In soil management trial with Laxton's Superb,* the initial phase of strong competition by the swards is apparently over (treatments started in 1951), **1954**, II, 21. Good growth and cropping of trees in grass plots where 6 cwt per acre of sulphate of ammonia applied annually, **1958**, II, 21.
In classical manurial trial with Cox, plots grassed down in 1953 had paler leaves, especially where no nitrogen had been applied, than those on the plots still under clean cultivation, **1954**, II, 21; improved appearance of these plots suggests that the phase of initial competition by the swards is passing, **1955**, II, 25. In plots receiving no nitrogen, grassing down has caused a reduction in the total crop; fruit colour was much better on the grass plots, even where nitrogen is added; clover content of the swards has been greatly reduced by the annual application, since 1953, of 6 cwt per acre of sulphate of ammonia, **1957**, II, 18. Trees in the grass plots carried the *heavier* crops, **1958**, II, 20, and their fruit showed less cracking, **1958**, IV, 164. Drought symptoms occurred mostly in the grass plots, which in this dry year carried the lighter crops; this reduction was more marked in the absence of nitrogen **1959**, II, 18. In this wet year the trees under grass carried the *heavier* crops; lighter foliage of trees under grass without applied nitrogen, **1960**, II, 21.

straw mulch — in soil management trial with Laxton's Superb, straw mulch has greatly increased tree growth and a lighter pruning method is now being adopted, **1958**, II, 21.

cherries — notes on, **1959**, II, 20; **1960**, II, 23. Pilot trial planted to observe effect of grassing down at annual intervals, 2–7 years from planting, **1954**, II, 22.

raspberries–

straw mulch — crop from mulched plots less than that from the clean cultivated ones, partly owing to soil surface compaction with consequent surface waterlogging, **1954**, II, 25.
In newly-planted trial with Malling Exploit and Malling Jewel comparing straw mulch (unwatered) with clean cultivation (with and without irrigation), mulching in March delayed the development of new cane; future mulchings will be in October, **1956**, II, 23. Better yields as a result of the stronger and taller canes

Soil management–raspberries–straw mulch–*continued*

produced the previous year, **1958**, II, 21. Increased yields by about 20%, but with little summer rainfall growth vigour was not maintained, **1959**, II, 18. Increases of 11% and 17% in crops of Jewel and Exploit respectively, compared with the clean cultivated unwatered plots, **1960**, II, 20. Increase in yield of Jewel amounted to 40% and of Exploit 14%, largely due to increased berry size; these crop increases were similar to those obtained with irrigation, **1961**, II, 20.

,, moisture studies — *see also under* Frost, soil conditions influencing incidence; Irrigation; Soil management; Soil moisture tensiometer; Soil properties.
when trees of Laxton's Superb apple on sandy soil were artificially droughted, the total weight of fruit picked was 42% of that from the controls, and the weight in the size grades 2¼–3 in. was only 32% of the controls; heavy fruitlet drop, high fruit colour and early defoliation also resulted, **1955**, II, 26. **Soil moisture deficits developed under long and short grass**, by J. E. Goode; long grass fully exploited the moisture reserves to a soil depth of 3 ft; short grass fully exploited the 0–18 in. depth, but only partially utilized the reserves in the 18–36 in. depth. Close and frequent mowing may conserve from 1·0 to 1·5 in. of water, **1955**, III, 64. **Soil moisture deficits under swards of different grass species in an orchard**, by J. E. Goode; the depth of drying was greatest with S.23 and least with annual meadow grass, S.50 being intermediate, **1955**, III, 69. Effect on mineral composition of trees growing in pots in wet and relatively dry soil, **1958**, II, 23. In soil management trial with Laxton's Superb, severe drying to a depth of 4 ft occurred under grass, and to a depth of 3–4 ft under mulch; least drying occurred under clean cultivation, **1959**, II, 20.

,, ,, tensiometer — **The soil moisture tensiometer: its practical value for field use in fruit crops and its construction**, by J. E. Goode and K. J. Hyrycz, **1959**, III, 78.

,, nitrogen level — *see also under* Soil properties.
notes on, **1958**, II, 20.
Seasonal trends: notes on, **1959**, II, 19; **1960**, II, 20. Available nitrogen in orchard soils under grass markedly lower than under clean cultivation; nitrate levels in the top 2 ft of the cultivated plots receiving 'Nitro-chalk' each year were highest at the end of June, and with onset of wet weather fell to very low values by October, **1960**, II, 21; **1961**, II, 21.

,, pH — *see under* Soil surveys; Statistical studies, soil pH effect.

,, properties — *see also under* Soil management.
Soil management effects on a number of chemical and physical properties of the soil, by J. E. Goode and G. C. White; *under clean cultivation* the available phosphorus and magnesium decreased during the 5-year period, as well as the total nitrogen and organic matter; *under grass* there was a marked increase in organic matter, and losses of soil moisture were two to three times those from cultivated soil; *mulching* increased the available phosphorus and potassium but tended to depress the available magnesium: the organic matter content of the soil was barely maintained at its original level: and the soil moisture conditions, in contrast to those under the other treatments, remained close to field capacity throughout the summer seasons, **1957**, III, 113. **Soil management effects on various soil properties and their possible influence on fruit crops**, by J. E. Goode and G. C. White, **1957**, IV, 155.

,, residues–aldrin — *see under* Insecticide persistence, aldrin.

Soil residues–*continued*

BHC — notes on, **1961**, II, 35.

phloridzin — in relation to the apple replant problem; little deleterious effect even of very heavy and frequent doses on apples in sand culture, **1960**, II, 17; **1961**, II, 19.

„ sampling — for assessing ground beetle population; *see under* Insect catching/counting.

„ surveys — **Report on the soils of the Trust Land,** by B. S. Furneaux, **1959**, III, 44. **A survey of the pH of the soils of East Malling Research Station**, by G. C. White; determinations were made at 22-yard intervals on the surface soil (0–6 in.) and 'sub-soil' (6–12 in.); two coloured maps, with the distribution of the soil reaction in 0·5 unit ranges, show that the range of pH values was 4·0 to 8·5, 75% being in the 5·5 to 7·5 range, **1960**, III, 77.

„ temperature — *see also under* Frost, soil conditions influencing incidence.
a soil temperature of 85° F maintained during the four summer months had no marked adverse effect on the growth of Cox on M.IX, M.II and M.XVI, **1957**, II, 5.

„ type — *see under* Gloeosporium rots, orchard factors, soil type; Soil surveys.

„ uniformity — notes on progress of a field trial on the restoration of soil uniformity on the site of an old apple orchard, **1954**, II, 29; **1955**, II, 25, 32; **1956**, II, 16; **1957**, II, 13; **1958**, II, 14; **1959**, II, 13; **1960**, II, 14; **1961**, II, 15.

„ variation — *see under* History of Research Station land; Replant problem; Soil surveys; Soil uniformity.

Solution culture — *see also under* Mineral composition, apple plants; Mineral nutrition, iron and magnesium.
notes on technique, **1958**, II, 15. **Experimental approach to the development of an adequate technique for water culture of apples,** by B. D. Bolas and H. C. Ruck; adequate aeration of the culture solution is essential, and its temperature must be maintained below 25° C to avoid root infection, **1955**, III, 101.

Sooty black mould (*Cladosporium herbarum*) — notes on, **1955**, II, 44.

Sorbus spp. — *see under* Fire-blight disease of pear, general.

Source factors — *see under* Propagation, source factors.

„ plants, growth of — *see under* Mineral nutrition, nitrogen and potassium.

Special Stock plants — *see under* Loganberries, Special Stock; Strawberries, Nuclear Stock.

Spectrographic analysis — *see under* Analysis, spectrographic.

Speudotettix subfusculus — *see under* Green petal virus, virus vector studies.

Sphaeroblasts — *see under* Propagation, sphaeroblast shoots.

Sphaerotheca macularis — *see under* Strawberry powdery mildew.

Sphegid wasp (*Trypoxylon attenuata*) — observations on, **1957**, III, 134.

Spiders — **Predacious spiders and mites on fruit trees,** by D. A. Chant, **1956**, IV, 175.

Split leaf blotch, hops — *see also under* Virus diseases, indicator plants, hops.
The spread of nettlehead disease and its association with split leaf blotch virus in certain hop varieties, by J. T. Legg; evidence from field trial of latent infection with split leaf blotch virus in the two Fuggle clones used, and suggestion that clones of the other six varieties are potential carriers, **1954**, III, 128. **Research on hop virus diseases at East Malling**, by J. T. Legg and P. J. Ormerod;

Split leaf blotch, hops–*continued*

in two field trials the yield from Fuggle plants showing symptoms of split leaf blotch was only half that from symptomless plants; no completely healthy selections of Fuggle as yet available, **1958**, IV, 157.

Splitting, fruit — *see under* Fruit splitting.

Spore germination — *see under* Apple scab, infection conditions; Fungicide testing, glass-slide method; Gloeosporium diseases, spore production.

Spray(ing)–

compatibility — *see under* Insecticides, compatibility.

concentrate — *see also under* Apple mildew, field trials; Apple sawfly; Apple scab, field trials; Pear scab, field trials; Spray damage investigations, black currants.
notes on, **1954**, II, 36. In greenhouse studies using MM.109 apple rootstocks, applying lime-sulphur concentrate by a spinning disc, sprays with the smallest and most numerous droplets showed greatest promise for post-infection control of scab and mildew, **1960**, II, 28.

culture — *see under* Mineral nutrition, iron and magnesium.

damage investigations–

apples — *see also under* Skin finish, apples, effect of sprays.
notes on, **1956**, II, 37; **1957**, II, 33; **1958**, II, 37; **1959**, II, 36; **1960**, II, 37. Chlorotic spotting of Laxton's Superb leaves by PMC, **1955**, II, 49, but no damage or loss of crop on a number of other varieties, **1956**, II, 37. PMC applied twice pre-blossom to Cox caused leaf scorch, and longitudinal splitting of fruit truss stems, followed by wilting and fall of trusses, **1959**, II, 35. **Damage on apple by arsenic, copper and mercury sprays: a seven year study**, by A. H. M. Kirby and Margery Bennett; 0·1% sodium arsenate caused almost total loss of fruit on Cox, some loss on Worcester and negligible loss on Laxton's Superb: leaf scorch on all three varieties was severe. With mixtures of 0·5% lime-sulphur and arsenates of lead, zinc and aluminium, neither leaf nor fruit damage was serious. PMC at 0·005% caused some leaf spotting and fall on all three varieties in 1955, as well as fruit loss and russeting on Cox in 1958, when wet weather followed spraying. Bordeaux mixture at 4:6:100 caused necrotic spotting of leaves and severe russeting of fruit on all three varieties in all years, with loss of crop on Cox and Worcester, **1959**, III, 112. **Phytotoxicity trials of certain fungicides on Lane's Prince Albert apple**, by A. H. M. Kirby and Margery Bennett; trees were sprayed twice pre-blossom and thrice post-blossom in four successive years with dinocap or captan or both. Dinocap, at 0·05%, caused consistent reduction of fruit set and mature fruit as compared with captan alone; addition of captan confers a wider margin of safety, **1960**, III, 113. Applications of 2½% lime-sulphur at green cluster and pink bud caused scorch on the leaves of Laxton's Superb and Cox, but not on Worcester, **1961**, II, 18.

black currants — no loss of crop following application of lime-sulphur, high- or low-volume, **1957**, II, 33; **1958**, II, 37. **Phytotoxicity trials with acaricides on black currant and plum**, by A. H. M. Kirby and Margery Bennett; bushes were sprayed at the grape stage in several years with lime-sulphur, 2%; fenson, 0·1%; chlorfenson, 0·1%; diphenyl sulphone, 0·2%; chlorbenside, 0·1%; chlorbenzilate, 0·1%; and malathion, 0·09%. Lime-sulphur caused some marginal scorch, but there was no damage to leaf or fruit and no loss of crop, **1957**, III, 152. **Phytotoxicity resulting from foliar applications of fluoroacetamide to black currants**, by G. H. L. Dicker and R. P. Tew; in

Spray(ing)–damage investigations–black currants–*continued*

trials with Baldwin and Wellington XXX, 0·05% fluoroacetamide applied at the beginning or at the end of the blossom period reduced berry size, and caused mild leaf chlorosis especially on Baldwin; a reduction in crop resulted from the later spray on XXX and when both were applied to Baldwin. Thiodan had no effect on yield, **1961**, III, 107.

cherries — *see under* Leaf fall, cherries.

gooseberries — no damage or loss of crop caused by lime-sulphur applied once at 2½% pre-blossom and twice at 1½% post-blossom, or by DNOPC applied at 0·05% pre- and post-blossom, **1958**, II, 37; **1959**, II, 36; **1960**, II, 37; no loss of crop on Lancashire Lad but on Leveller both fungicides caused loss, and bushes sprayed with lime-sulphur bore scarcely any fruit; second post-blossom application (mid-May) apparently responsible for crop loss with Leveller, **1961**, II, 37.

pears — notes on, **1955**, II, 49; **1956**, II, 37. **Further phytotoxicity studies with phenylmercuric chloride on Conference pear**, by A. H. M. Kirby and Margery Bennett; on young trees leaf damage was caused by complete schedules (two pre- and two post-blossom applications) at 0·01, 0·005, and 0·025% PMC, and even by a single application at 0·005% at petal-fall; reduced fruit-set and severe loss of picked crop were caused by the full schedules and by two applications at 0·01% PMC applied post-blossom only; damage apparently not related to weather conditions, **1957**, III, 148.

plums — **Phytotoxicity trials with acaricides on black currant and plum**, by A. H. M. Kirby and Margery Bennett; chlorfenson or chlorbenside, at 0·5%, applied in mid-May or mid-June, caused no damage to leaf or fruit, **1957**, III, 152.

defoliating — *see under* Biennial bearing, defoliation trials.

deposits — *see under* Acaricides; Fungicides; Harvest residues; Insecticides.

low volume — *see under* Spraying, concentrate.

persistence — *see under* Acaricide persistence; Fungicide persistence; Insecticide persistence.

pre-blossom — *see also under* Fruit drop, apples; Mineral deficiencies, magnesium. notes on, **1956**, II, 35; **1958**, II, 31, 35; **1959**, II, 30. Results of field trials during period 1951–7 show that satisfactory control of aphids, apple sucker and winter moth cannot always be achieved with a single pre-blossom application of DDT, BHC, a combination of DDT and BHC, or endrin, **1957**, II, 29.

programme — routine, on Experimental Farm, **1954**, I, 17; **1955**, I, 20; **1956**, I, 5; **1957**, I, 2; **1958**, I, 4; **1959**, I, 3; **1960**, I, 3; **1961**, I, 4.

residues — *see under* Harvest residues; Insecticide persistence.

Spur blight, raspberries — *see under* Raspberry spur blight.

,, wilt, cherries — *see under* Bacterial canker, cherries.

S.R. 406 — *see under* Captan.

Staddle production, cherries — *see under* Tree shaping, cherries.

,, -working–

cherries — *see under* Tree form, cherries.

plums — *see under* Stem-building, plums.

Staking — *see under* Tree staking and tying.

Starch reserves — *see under* Carbohydrate resources.

Star-crack — notes on, **1957**, II, 24. Graft-transmissible, **1958**, II, 27.

Statistical studies– — *see also under* Statistics and Records Section.

apples — *see also under* Statistical studies, soil pH effect.
Studies in the measurement of apple trees. III. The use of branch girths as a substitute for the trunk girth, by S. C. Pearce; where trunk girths cannot be obtained, the sum of the branch girths larger than 5 cm, divided by the square root of their number, is a satisfactory substitute, **1955**, III, 76. **Sampling methods for the measurement of extension growth of apple trees**, by G. M. Jolly and D. A. Holland; systematic shoot sampling, involving an average of twenty to twenty-five selected shoots, is suitable for use when a high degree of accuracy is required; random branch sampling is applicable to large trees, and is less accurate, **1957**, III, 87. **Studies in the measurement of apple trees. IV. The use of branch girths to estimate tree size**, by D. A. Holland; when the measurement of trunk girth is impracticable, an integration of branch girths as an estimate of tree size is a satisfactory substitute, **1958**, III, 77.

black currants — **The assessment of wood growth in black currant bushes**, by G. H. Freeman and J. A. Thompson; a sample of about ten shoots per bush is usually sufficient, and it is preferable to measure a sample on all bushes in a plot rather than the whole of only some, **1959**, III, 67.

experimental design — **A review of experimental design at East Malling**, by S. C. Pearce and G. H. Freeman, **1958**, III, 67.

fruit tree red spider mite — **Some statistical aspects of a recent series of fruit tree red spider mite control trials**, by G. H. Freeman and Margaret J. Hall, **1954**, III, 102.

multivariate analysis — notes on, **1958**, II, 13; **1959**, II, 13; **1960**, II, 14. **Some recent applications of multivariate analysis to data from fruit trees**, by S. C. Pearce, **1958**, III, 73.

soil pH effect — **Soil acidity in relation to trunk girths of apples**, by D. A. Holland; limitations on detecting a relationship between soil pH and trunk girth of apple trees are imposed by the sampling error of soil pH; three possible relationships between soil pH and trunk girth are discussed, **1955**, III, 80.

Statistics and Records Section — general review of research work, **1954**, II, 28; **1955**, II, 31; **1956**, II, 16; **1957**, II, 12; **1958**, II, 13; **1959**, II, 12; **1960**, II, 13; **1961**, II, 14.

Stem and bulb eelworm — *see under* Eelworms, stem and bulb.

,, -building– — *see also under* Double-working, interstocks.

cherries — *see under* Tree form, cherries.

plums — notes on, **1961**, I, 5; II, 7. **Stembuilder trials with plums**, by Elizabeth M. Glenn; tree size and cropping of Victoria on Myrobalan B were the same regardless of whether the stem and crotch was formed by the scion variety or by the rootstock. The inclusion of a stem and crotch of Pershore between the Victoria scion and Myrobalan B rootstock had no effect on tree size and cropping, **1961**, III, 61.

,, growth — *see under* Growth analysis, shoots and stems; Statistical studies, apples.

,, pitting virus — *see also under* Peach green mottle virus; Rootstocks, apple, virus infection.
notes on, **1959**, II, 27. Results of numerous graft inoculations strongly suggest that this virus is the cause of the dark green mottle symptoms on peach, **1961**, II, 29.

Stem taper, apples — *see under* Growth analysis, shoots and stems.

Stereum purpureum — *see under* Silver leaf.

Stock-on-stock experiment — *see under* Growth analysis, stock-scion interaction.

Stock-scion interaction — *see under* Growth analysis, stock-scion interaction; Incompatibility; Rootstocks, plum, resistance to bacterial canker.

Stolbur disease — *see under* Strawberries, virus diseases, virus vector studies.

Stoolbeds — *see under* Nurseries and stoolbeds, Experimental Farm.

Storage, fruit — *see under* Fruit storage investigations.

Strawberry(ies)–

aphid (*Pentatrichopus fragaefolii*) — *see also under* Strawberry virus diseases, virus vector studies.
A field study of the spread of apterous forms of the strawberry aphid, *Pentatrichopus fragaefolii* (Cock.), by G. H. L. Dicker; following artificial infestation in July aphids had by November spread to 15 ft on either side of the original point of infestation, but little further movement occurred between November and April, **1959**, III, 105.

botrytis — *see under* Strawberry grey mould.

cauliflower disease — *see under* Cauliflower disease, strawberries.

Climax — *see also under* Strawberries, tasting trials; —, variety and strain trials, general.
all the clones of Climax which had remained green for the first two years following propagation by disc cuttings showed 'yellows', **1961**, II, 11.

crinkle — *see under* Strawberry virus diseases, virus vector studies; Virus diseases, heat treatment, strawberries.

cropping — *see under* Strawberries, cultural trials; —, Experimental Farm, —, variety and strain trials.

cultural trials — *see also under* Verticillium wilt, strawberries, soil fumigation.
notes on, **1954**, II, 25; **1955**, II, 28; **1956**, II, 14; **1957**, II, 9; **1960**, II, 11. **More economical strawberry planting**, by W. S. Rogers; the new hill-mat planting system offers great savings in costs of planting and early cultivation. It involves planting at 36 in. square, cultivating both ways until the runners are ready to root, and then laying the runners to form matted rows 18 in. wide; such matted rows yield just as well as ones formed from twice the number of parents, **1956**, IV, 173. In trial comparing spaced plants with matted rows of Talisman, first main crops were similar, **1958**, II, 10; in the following year, despite the severe drought, yields from matted rows were the higher; in similar trial with Cambridge Vigour and Cambridge Favourite, competition for water between plants in the matted rows severely reduced the yield of both varieties, **1959**, II, 9.
Early planting trial planted in July, comparing runners of the variety Redgauntlet kept in a cold store at 30° F since February, and freshly dug runners, **1960**, II, 11; plants from both sources grew well and yielded a first crop of over three tons per acre at the normal spacing of 3 × 1½ ft, **1961**, II, 11.

deblossoming — notes on, **1956**, IV, 174.

eelworms of — *see under* Cauliflower disease, strawberries; Eelworms, leaf and bud; —, soil migratory; —, stem and bulb.

Experimental Farm — acreage, cropping, and general notes, **1954**, I, 16; **1955**, I, 18; **1956**, I, 4; **1957**, I, 2; **1958**, I, 2; **1959**, I, 2; **1960**, I, 2; **1961**, I, 3.

frost damage investigations — *see under* Frost damage investigations, strawberries.

Strawberry(ies)–*continued*

fruit rot — *see under* Strawberry grey mould.

green petal — *see under* Green petal virus.

grey mould (*Botrytis cinerea*) — *see also under* Farm, Experimental, reports.
captan reduced incidence of rotting in the berries, **1954**, II, 37, but may cause taint, **1955**, II, 29. Cambridge Regent worst affected variety, **1956**, II, 12. In tests under glass with picked strawberries, thiram was the most effective fungicide tried; cinnamic acid had some effect, and griseofulvin none, **1956**, II, 30. Heat-treated clones tended to be more affected than untreated ones, **1957**, III, 50. **Controlling strawberry botrytis**, by M. H. Moore; a first spray of thiram or captan at normal strength during blossoming is recommended, and two or three more sprays are necessary to give good control. Alternatively the bloom spray could be followed by one spray of thiram or captan at 3 times normal strength, directed down on to the trusses to protect the calyces when most berries are about half-grown (or earlier if necessary), **1960**, IV, 132. Schedules of four and two sprays of thiram compared, **1961**, II, 27.

ground beetles — *see under* Ground beetles, strawberries.

growing — *see also under* Strawberries, cultural trials.
in N. Italy, **1960**, IV, 128. In France, **1961**, IV, 129.

harvest residues — *see under* Harvest residues, strawberries.

heat-treated clones — *see under* Strawberries, variety and strain trials, heat-treated clones.

heat treatment — *see under* Virus diseases, heat treatment, strawberries.

hill, hill-mat systems — *see under* Strawberries, cultural trials.

manuring — *see under* Manuring, strawberries.

matted row system — *see under* Strawberries, cultural trials.

mildew — *see under* Strawberry powdery mildew.

mosaic — **Strawberry mosaic virus disease**, by A. F. Posnette; Royal Sovereign is the only variety so far known to be infected; characteristic symptoms are large yellow areas on the leaves, **1955**, III, 120. **Strawberry mosaic and apple mosaic virus in strawberry**, by R. Cropley, Christina E. Ellenberger and Asharfi Jha; strawberry mosaic of the variety Royal Sovereign is caused by certain strains of the soil-borne raspberry yellow dwarf (arabis mosaic) virus. Apple mosaic, an apparently unrelated virus, caused similar symptoms, **1959**, III, 96. All of the 15 strawberry varieties tested were susceptible to arabis mosaic virus, **1960**, II, 29.

Nuclear Stock — notes on varieties issued to the Nuclear Stock Association, **1955**, IV, 154; **1956**, II, 28; **1957**, II, 25; **1958**, II, 28; III, 60.

powdery mildew (*Sphaerotheca macularis*, syn. *S. humuli*) — in a small-scale field trial on Cambridge Rearguard, the disease was effectively controlled by lime-sulphur and dinocap, **1961**, II, 36.

propagation — *see under* Propagation, strawberries.

Royal Sovereign — *see under* Strawberries, tasting trials; —, variety and strain trials; Virus diseases, indicator plants, strawberries.

runners, runner production — *see under* Strawberries, cultural trials; Virus diseases, heat treatment, strawberries.

seed beetle (*Harpalus rufipes*, syn. *Pseudophonus rufipes*) — *see under* Ground beetles, strawberries.

Strawberry(ies)–*continued*

spray residues — *see under* Harvest residues, strawberries.

stolbur disease — *see under* Strawberry virus diseases, virus vector studies.

streak — *see under* Strawberries, variety and strain trials, general.

tasting trials — **Preliminary tasting trials with strawberries and raspberries**, by D. W. Way and G. H. Freeman; Royal Sovereign (M.48) and Auchincruive Climax (M.46) were judged the most palatable of the varieties tested, **1954**, III, 96.

variety and strain trials– — *see also under* Verticillium wilt, strawberries, varietal tolerance.

general — notes on, **1954**, II, 24; **1955**, II, 27; **1956**, II, 12; **1957**, II, 8; **1958**, II, 10; **1961**, II, 10. **The effects of transient yellows and streak in Auchincruive Climax strawberry**, by Dorothy J. Wilson; the presence of either transient yellows or streak in the parent plants depressed both the vigour and cropping of their runners, **1954**, III, 86. **Royal Sovereign strawberry clone M.415**, by W. S. Rogers and Muriel G. Fromow; the new clone yielded 11% more fruit than the clone M.48 over a period of eight years. The increased yield came mainly in the later picks, and from a longer cropping season, **1958**, III, 60. Maiden crop of autumn-planted clones of Cambridge Favourite was 25 cwt per acre; that from spring planting was only 11 cwt (heat-treated clone) and 15 cwt (untreated clone), **1959**, II, 8. In trial with eight varieties Cambridge Favourite gave the highest yields, nearly 8 tons per acre, **1959**, II, 8, and 5½ tons per acre, **1960**, II, 10, while Merton Princess yielded the most first-grade fruit, **1959**, II, 8.

heat-treated clones — notes on, **1954**, II, 24; **1955**, II, 27; **1957**, II, 8; **1958**, II, 10. Heat-treated clones of Cambridge Rearguard, Cambridge Prizewinner and Early Cambridge carried a heavier maiden crop than the old clones; with the increased leafiness of the heat-treated clones there was a tendency for the fruit to be more shaded and ripen a little later. Three-year plants of heat-treated clones of Huxley and Perle de Prague grew more vigorously and cropped more heavily than the old clones, **1956**, II, 12. **The field performance of heat-treated strawberry clones**, by W. S. Rogers and Muriel G. Fromow; heat-treated clones grew more vigorously and the yields of several varieties including Cambridge Favourite and Huxley were markedly increased; with Early Cambridge and Rearguard, however, yields were decreased owing to the excessive vigour induced. The fruit of treated clones was rather later ripening and showed rather more rotting. The treated clones succumbed more slowly to virus re-infection in the field, **1957**, III, 50. Maiden crop of heat-treated and untreated clones of Cambridge Favourite, autumn planted, was 25 cwt per acre; corresponding yields from spring planting were 11 cwt and 15 cwt respectively, **1959**, II, 8. Heat-treated plants of Cambridge Favourite and Early Cambridge were not only more vigorous but had more crowns, **1960**, II, 10; the heat-treated Early Cambridge plants, however, continued to produce fewer blossoms than an untreated clone, **1961**, II, 10.

vein chlorosis virus — *see under* Virus diseases, heat treatment, strawberries.

verticillium wilt — *see under* Verticillium wilt, strawberries.

virus diseases– — *see also under* Strawberry mosaic; Virus diseases, heat treatment, strawberries; — —, indicator plants, strawberries; Yellow crinkle, strawberries.

virus vector studies — *see also under* Eelworms, soil migratory, virus vector studies; Green petal virus.
a virus complex of at least two viruses, producing crinkle-like

Strawberry(ies)–virus diseases–virus vector studies–*continued*

symptoms on varieties known to be tolerant of the crinkle virus, was transmitted by the strawberry aphid; a virus producing symptoms similar to those of stolbur disease was transmitted by naturally infected specimens of the leafhopper *Thamnotettix dilutior*, **1959**, II, 27.

virus-tested clones — *see also under* Strawberries, Nuclear Stock; —, variety and strain trials, heat-treated clones; Virus diseases, heat treatment, strawberries.
notes on maintenance of stocks under insect-proof conditions and in runner beds, **1954**, II, 24; **1955**, II, 28; **1956**, II, 13; **1957**, II, 9; **1958**, II, 10; **1959**, II, 9; **1960**, II, 10; **1961**, II, 11.

virus testing — *see under* Virus diseases, indicator plants, strawberries; Virus testing, strawberries.

weedkillers — *see under* Weedkillers, strawberries.

yellow crinkle — *see under* Yellow crinkle, strawberries.

yellows — *see under* Strawberries, variety and strain trials, general.

Straw mulch — *see under* Soil management, apples, straw mulch; — —, raspberries, straw mulch; Soil moisture studies; Soil properties.

Streak — *see under* Strawberries, variety and strain trials, general.

Streptomycin — *see under* Bacterial canker, cherries, field trials.

Stunt virus — *see under* Plums, virus diseases.

Suckering, raspberries — *see under* Genetical studies, general.

Sudden wilt, blackberries — apparently caused by a virus transmitted by a leafhopper, **1961**, II, 30.

Sugar analysis — *see under* Analysis, chemical, organic, fruit plants.

Sulphur — *see under* Analysis, chemical, inorganic, sulphur; Lime-sulphur.

Summer fruit tortrix moth (*Adoxophyes orana*) — observations on, **1955**, III, 132; **1956**, III, 131. Notes on, **1961**, IV, 121.

,, ovicides — *see under* Acaricides.

,, pruning, plums — *see under* Tree form, plums.

Taper, root — *see under* Growth analysis, roots.

,, , stem — *see under* Growth analysis, shoots and stems.

Taphrina deformans — *see under* Peach leaf curl.

Tar oil — *see under* Apple mildew, field trials; Biennial bearing, deblossoming trials; Insect fauna; Spraying programme.

Tasting, fruit — **Preliminary tasting trials with strawberries and raspberries**, by D. W. Way and G. H. Freeman; describes methods of assessing the palatability of different varieties of soft fruit, involving individual assessment of randomly presented varieties, **1954**, III, 96. **The selection and use of a panel for taste sensitivity tests with fruit**, by G. H. Freeman; selection procedure consisted of three series of trials, involving assessment of primary flavours, discrimination between fruits, and assessments of combinations of primary flavours. The panel, of six to ten members, was used to describe the flavour characters of different varieties of fruit, or of the same variety grown under different conditions or treatments, **1955**, III, 86.

Tatter leaf, cherries — *see under* Cherries, virus diseases.

Tedion — *see under* Acaricides, persistence; Fruit tree red spider mite, field trials.

Temperature– *see also under* Frost.

control, in glasshouses *see under* Glasshouses, Experimental Farm.

effect on growth *see also under* Growth analysis, leaves; — —, shoots and stems.
The limit of plant productivity, by Prof. G. E. Blackman, **1961**, III, 39.

records *see under* Meteorology, horticultural.

soil *see under* Soil temperature.

Tensiometers *see under* Soil moisture tensiometers.

Tetranychid mites *see under* Mites, Tetranychid.

Tetranychus crataegi description and life history, **1955**, III, 135.

,, *telarius* (syn. *T. urticae*) *see under* Red spider mite.

Thamnotettix dilutior *see under* Leafhoppers, virus vector studies.

Thinning, fruit *see under* Fruit thinning, apples.

Thiodan *see under* Spray damage investigations, black currants.

Thiram *see under* Apple scab, field trials; Fungicide testing, glass-slide method; Strawberry grey mould.

Thrips sp. observations on, **1955**, III, 133.

Ties, budding *see under* Propagation, budding ties.

Tip dieback, apples *see under* Apple dieback.

,, -layering *see under* Propagation, blackberries; —, loganberries.

,, rooting *see under* Genetical studies, general.

Titan Yellow *see under* Analysis, chemical, inorganic, magnesium.

Top fruits– *see under* the individual fruits or the subject.

Experimental Farm acreage, cropping, and general notes, **1954**, I, 15; **1955**, I, 17; **1956**, I, 3; **1957**, I, 1; **1958**, I, 1; **1959**, I, 1, **1960**, I, 1; **1961**, I, 1.

Tortrix (tortricid) moths *see under* Fruit tree tortrix moth; Summer fruit tortrix moth.

Toxaphene *see under* Codling moth, insecticide trials.

Trace elements *see under* Mineral deficiencies.

Tractor vaporizing oil *see under* Weedkillers, top fruit.

Transient yellows *see under* Strawberries, variety and strain trials, general.

Tree density, apples *see also under* Tree spacing, apples.
Effect of tree density in an exposed apple orchard, by A. P. Preston; three 10-acre plots were planted on a hilltop site in 1946, with three tree densities: *low density* (consisting of permanent trees only, at 25½ ft square on M.II), *medium density* (containing in addition one filler tree on M.VII), and *high density* (with three filler trees on M.IX to every permanent tree). The permanent trees (Cox) in the high and medium density plots yielded 59% and 67% more fruit respectively than those on the low density plot. Of the filler trees (Cox, Worcester and Sunset), those on M.VII afforded the greater reduction in wind-flow, but they cropped relatively poorly, and those on M.IX did much better, **1959**, III, 52. Similar trial planted on less exposed site, with permanent trees on MM.104 at 24 ft square, and two tree densities, **1961**, II, 9.

,, form–

apples *see also under* Tree shaping, apples.
notes on the 'multiple central leader' form used in New Zealand, **1959**, IV, 120.

cherries *see also under* Tree staking and tying.
notes on, **1961**, I, 5. Trial planted with F12/1 as rootstock and stem-builder, in relation to the incidence of bacterial canker;

Tree form–cherries–*continued*

three grafting methods compared—high-working with a single scion, staddle-working about 1 ft from the crotch, and frame-working when 4–5 years old, **1954**, II, 21. High-worked and staddle-worked trees beginning to crop at the same time, **1959**, II, 7.

pears — *see under* Pruning, pears.

plums — trial with Victoria on Brompton comparing summer-pruned pyramids, half-standards which receive a little pruning in late spring, and unpruned trees; the latter were the least affected by bacterial canker, **1955**, II, 26. Similar trial planted with Victoria on St. Julien A, **1961**, II, 9. **Three tree forms for plums**, by A. Beryl Beakbane and A. P. Preston; up to the eighth year the unpruned trees yielded the heaviest crops, but they were equalled by the half-standards in the ninth year; the pyramid trees were the smallest in size, and had the least branch breakage and consequent incidence of silver leaf, **1961**, III, 57.

,, growth — *see under* Growth analysis; Growth, general.

,, habit, apples — *see also under* Tree size, apples.
A comparison of the growth and cropping of apple trees of different habit, by C. S. Moore; there was no initial difference in tree size between 'erect' and 'spreading' trees (classified on a branch angle basis), but the earlier crops were heavier on the spreading trees. Erect trees eventually grew larger and produced heavier crops, but the crop per unit of trunk girth was heavier on the spreading trees. Heavily feathered trees appear to be predisposed towards a spreading habit. The angles at which the early branches, particularly the highest, are formed provide an indication of future habit, **1961**, III, 87.

,, measurement studies — *see under* Statistical studies.

,, shaping–

apples — descriptions of open-centre, delayed open-centre and regulated methods, **1959**, IV, 122.

cherries — gibberellic acid induced the upper buds of F12/1 rootstocks for staddle production to break, but the angles tended to be narrow; GA and kinetin, alone or together, had no effect on bud growth of maiden trees of Napoleon, **1961**, II, 17.

plums — notes on attempts to improve the crotch angles of young trees by application of indole butyric acid in lanolin to the cut-back maiden stem, **1954**, II, 31; **1961**, III, 57; largely ineffective, **1958**, II, 15. Branch angles at right angles to the stem were obtained by removing six or twelve leaves from the terminal cluster of unexpanded leaves at the tip of a rapidly growing shoot. The growth of these branches was improved by subsequently cutting out the main stem above the defoliated region, **1958**, II, 15. Gibberellic acid at 1,000 p.p.m. applied to the shoots of maiden trees of Cambridge Gage resulted in greatly increased extension of the main axis, **1961**, II, 17.

,, size– — *see also under* Rootstocks.

apples — *see also under* Statistical studies, apples; Tree habit, apples.
in pruning trials with Cox, Worcester Pearmain and Laxton's Superb, the regulated-pruned trees were the largest and the established-spur pruned ones the smallest during the early years; at fourteen years of age, however, the established-spur pruned trees were generally the tallest but least spreading, **1959**, IV, 123.

plums — *see under* Stem-building, plums; Tree form, plums.

Tree spacing–

apples — *see also under* Tree density, apples.
notes on, **1958**, III, 47, 50; IV, 149.

plums — notes on, **1960**, IV, 130.

,, spread — *see under* Tree habit, apples; Tree size.

,, staking and tying — in trial with plum trees comparing six methods of tying (three using string or rope and three patent ties), all ties had to be loosened at least twice in the first year and at least three times the second year after planting, **1958**, II, 9; all methods have shown some defects after three years, **1959**, II, 8.
In trial of cherry tree forms, the standard trees have suffered some damage at the stake ties, but bush trees with 3-ft trunks have almost entirely escaped damage, and are now so well anchored that the stakes have been removed, **1959**, II, 7.

Tri-iodobenzoic acid — *see under* Biennial bearing, deblossoming trials.

Trithion — *see under* Acaricides, persistence.

Trunk-cutting studies — in trials with cordon pear trees, **1955**, II, 26, severely interrupting the conducting tissues of the stem by saw cuts did not delay blossoming, but caused reductions in the length of extension shoots, in leaf size and in fruit size, **1956**, II, 23.

,, girths — *see under* Statistical studies, apples.

Trust Land — *see also under* Soil surveys.
notes on acreage farmed, **1960**, I, 1; **1961**, I, 1, 3.

Trypoxylon attenuata — *see under* Sphegid wasp.

Tydeman's Early Worcester, ,, Late Orange — *see under* Apple varieties.

Typhlocyba spp. — *see under* Leafhoppers, on apples.

Typhlodromid mites — *see under* Beneficial insects and mites, predators, fruit tree red spider mite.

Uniformity trials–

apples — notes on progress of uniformity trial with Cox and Worcester on M.VII, **1954**, II, 29; **1955**, II, 32; **1956**, II, 17; **1957**, II, 13; **1958**, II, 14; **1959**, II, 13; **1960**, II, 14; **1961**, II, 14.

soil — *see under* Soil uniformity.

Urea — *see under* Mineral nutrition, nitrogen.

Variation, soil — *see under* Soil variation.

Variegation, black currants — *see under* Black currants, variegation.

Variety and strain trials — *see under* the individual fruits.

Vasates fockeui — *see under* Mites, Phytoptid.

Vegetative propagation — *see under* Propagation.

Vein banding, black currants — *see under* Black currants, variegation.

,, chlorosis virus — *see under* Virus diseases, heat treatment, strawberries.

,, pattern virus — *see under* Black currants, vein pattern virus.

,, yellows, pears — *see also under* Virus diseases, heat treatment, general.
graft-transmitted, **1955**, II, 40. The virus reduced the growth of 4-year-old trees by nearly 50%, **1961**, II, 29.

Venturia inaequalis — *see under* Apple scab; Fungicide testing, glass-slide method.

,, *pirina* — *see under* Apple scab, host-parasite relations; Pear scab.

,, spp. — *see under* Apple scab, culture techniques; — —, host-parasite relations.

Verticillium albo-atrum — *see under* Verticillium wilt.

„ *dahliae* — *see under* Verticillium, quinces; Verticillium wilt.

Verticillium, pears (*V. dahliae*) — *see under* Verticillium, quinces.

„ , quinces (*V. dahliae*) — infection of Quince A rootstocks by *V. dahliae* cause of failure of young pear trees to establish, **1960**, II, 28. In tolerance trial of five quince rootstocks under Conference pear no symptoms of *Verticillium* infection were recorded after three years, despite soil inoculations, **1961**, II, 28.

„ wilt (*V. albo-atrum*, *V. dahliae*)–

hops– — *see also under* Bulletins on progress in research, verticillium wilt.

composting — **Machine picking in relation to progressive verticillium wilt of the hop. II. The effect of composting on the infectivity of machine-picked hop waste**, by G. W. F. Sewell, J. F. Wilson and D. G. Martin; after 21 weeks' composting, *V. albo-atrum* was destroyed in 99% of the infested samples. To achieve the sustained high temperatures necessary to kill *Verticillium* the compost mass should be of minimum surface area, insulated against heat loss, and adequately drained; it should be turned during the early stages. Even with efficient composting, hop compost should not be used on potato or strawberry land, nor on any area which may later be planted with hops, **1961**, III, 102.

ecological studies — *see under* Verticillium wilt, hops, soil relationships; — —, —, weed hosts.

host-parasite relations — notes on varietal tolerance and resistance mechanisms, **1954**, II, 34; **1955**, II, 38; **1956**, II, 26; **1957**, II, 22; **1958**, II, 26; **1959**, II, 25; **1960**, II, 27; **1961**, II, 28. **A study of wilt-tolerance in the hop by means of intervarietal graft complexes**, by P. W. Talboys and J. F. Wilson; the action of the hop root system in determining the severity of verticillium wilt symptoms does not result from the translocation of specific 'resistance' or 'sensitivity' factors, **1955**, III, 126. The character most consistently associated with high resistance appears to be early and complete suberization of the endodermis of the young roots, **1960**, II, 27.

machine picking — *see also under* Verticillium wilt, hops, composting.
notes on, **1959**, II, 25. **Machine picking in relation to progressive verticillium wilt of the hop. I. A study of the infectivity of machine-picked hop waste**, by G. W. F. Sewell and J. F. Wilson; symptomless infection can occur both in wilt-sensitive and wilt-tolerant varieties, and the harvesting of such infected plants involves their transport to the picking machine and the accumulation of large quantities of hop-waste in its vicinity. The highly infective nature of this waste was demonstrated experimentally, **1960**, III, 100.

resistance/tolerance — *see under* Breeding, hops; Verticillium wilt, hops, host-parasite relations; — —, —, tolerant varieties.

soil relationships — notes on, **1955**, II, 38; **1956**, II, 26; **1957**, II, 23; **1958**, II, 26; **1959**, II, 26; **1960**, II, 28. Trial started to assess the survival of *V. albo-atrum* in soils under various cropping and management programmes, **1956**, II, 26; after four years of grass cover no *V. albo-atrum* was recovered from land which had previously carried wilt-infested hops, but the fungus persisted under annual weed cover, **1961**, II, 28.

tolerant varieties — *see also under* Verticillium wilt, hops, machine picking.
Whitbread's Golding Variety hop: a note on wilt tolerance in the field and the establishment of a *Verticillium*-free planting stock, by J. F. Wilson; wilt tolerance of the variety is satisfactory and

Verticillium wilt (*V. albo-atrum, V. dahliae*)–hops–tolerant varieties–*continued*

comparable with that of Keyworth's Mid-season; *Verticillium*-free stock has been distributed to commercial propagators, **1956**, III, 128. **Density, Defender and Janus: three new wilt-tolerant hops**, by J. F. Wilson; these varieties have been released from the first of several breeding projects. *Density* is a late hop of vigorous growth habit and high yield potential; it is extremely sensitive to downy mildew. *Defender* is an early hop of vigorous growth habit and good yield potential; it is of above-average susceptibility to downy mildew. *Janus* is a mid-season hop of moderate growth vigour and yield potential; it is of average susceptibility to downy mildew, **1958**, III, 110. **Notes on three new wilt-tolerant hops**, by J. F. Wilson, **1958**, IV, 161.

weed hosts — notes on **1955**, II, 39; **1957**, II, 23. **Weed hosts of the 'progressive' hop strain of *Verticillium albo-atrum* Reinke and Berth.**, by G. W. F. Sewell and J. F. Wilson; all isolates of *V. albo-atrum* tested from groundsel, fat hen, annual nettle and black nightshade growing in hop gardens with 'progressive' wilt were virulent strains of the 'progressive' type. Problems in relation to the role of weed hosts in *Verticillium*-infested hop gardens are discussed, **1957**, III, 126.

strawberries–

soil fumigation — trial with chloropicrin and sodium methyl dithiocarbamate, **1961**, II, 11.

varietal tolerance — notes on, **1959**, II, 26. In trial with nine varieties on a site previously occupied by potatoes, incidence of wilt due to *V. dahliae* reached 80% in Vigour, 38% in Huxley, 36% in Rearguard, and about 10% in Mme. Lefebvre; it did not exceed 3% in Favourite, Premier, Sovereign, Merton Princess and Talisman, **1960**, II, 28; in the second year of the trial Mme. Lefebvre showed a marked increase of disease and Huxley a considerable reduction, **1961**, II, 28. **Tolerance to verticillium wilt diseases in the strawberry,** by P. W. Talboys, Margery Bennett and J. F. Wilson; inoculations with *Verticillium albo-atrum* and *V. dahliae* of pot-plants in plunging beds showed that under these very moist conditions all varieties were tolerant to *V. dahliae*, but only Talisman was markedly tolerant to *V. albo-atrum*. Under field conditions Talisman was highly tolerant to both species; Premier, Rearguard, Huxley and Royal Sovereign were moderately tolerant to *V. dahliae* but only slightly tolerant towards *V. albo-atrum*; Vigour was acutely sensitive to both species. *V. albo-atrum* was much more pathogenic under both environmental conditions than the more prevalent *V. dahliae*, **1960**, III, 94.

Virginia Crab — *see under* Virus diseases, indicator plants, apples.

Virus diseases– — *see also under* the common name of the disease or the virus.

general — **Viruses and virus diseases,** by F. C. Bawden; Amos Memorial Lecture, **1957**, III, 37.

heat treatment–

general — **Heat inactivation of some apple and pear viruses,** by A. F. Posnette, R. Cropley and L. D. Wolfswinkel; apple rubbery wood, pear vein yellows, quince bark necrosis and quince stunt viruses were inactivated in buds or the tips of young shoots by growing infected plants at 37° C. Healthy plants were raised from diseased plants by propagating these tissues, **1961**, III, 94.

hops — attempts to inactivate mosaic virus in Fuggle by heat treatment unsuccessful, **1955**, II, 41.

Virus diseases–heat treatment–*continued*

pears — *see also under* Virus diseases, heat treatment, general.
strain of Williams' Bon Chrétien compatible with Quince A successfully heat treated for vein yellows infection, **1958**, II, 27.

plums — line pattern virus in a late-ripening sport of Victoria apparently inactivated, **1957**, II, 24. **Heat inactivation of some viruses in plum varieties and rootstocks**, by Christina E. Ellenberger; plants infected either with plum bark split, plum line pattern or peach green mottle viruses were treated for periods of 15–39 days at 37° C; virus-free material was then propagated from growth made during the treatment. Peach green mottle virus was inactivated from entire plants of Victoria and Ontario, but Marianna plants remained infected, although healthy material was propagated from the tips of shoots grown at 37° C, **1959**, III, 99.

strawberries — *see also under* Strawberries, variety and strain trials, heat-treated clones.
notes on, **1954**, II, 36. Virus 1 can be permanently inactivated in most plants by exposure for two weeks at 37° C; viruses 2 and 3 were not so readily inactivated, **1955**, II, 40. **Production of virus-free strawberry runners**, by A. E. H. Rutter; potted plants are kept in an incubator at 100° F for periods of up to three weeks, with low humidity, **1955**, IV, 153. Mild virus infection removed from plants of Huxley, Early Cambridge and Favourite, **1958**, II, 28. **The use of cuttings and heat treatment to obtain virus-free strawberry plants**, by A. F. Posnette and Asharfi Jha; after treatment at 37° C for 2 or 3 weeks, plants of Favourite and Huxley were propagated from 0·5–1 cm disc cuttings; some of these plants were free from crinkle virus and probably also from vein chlorosis virus. These viruses had persisted in entire plants kept at 37° C for up to 40 days, **1959**, III, 98.

indicator plants–

apples — *Malus platycarpa*, Virginia crab, *Amelanchier* spp., *Cydonia* sp., *Chaenomeles* sp. and peach used as indicators for viruses latent in apple, **1960**, II, 28.

cherries — clone of *Prunus serrulata* shows promise as an indicator for necrotic ring spot virus, and apparently more sensitive to certain virus strains than the Shiro-fugen variety, **1957**, II, 24.

hops — Early Prolific an efficient indicator of nettlehead, **1954**, II, 35. None of the six clones developed from Fuggle seedlings has proved sufficiently sensitive for use as an indicator for split leaf blotch virus, **1959**, II, 28, but two cuttings from a heat-treated clone of Fuggle N show promise, **1961**, II, 30. *Humulus americanus* var. *neomexicanus* a sensitive indicator for line pattern virus, **1961**, II, 30.

pears — *Amelanchier* spp. inoculated with viruses that infect pears developed a red mottle on their leaves, **1957**, II, 24. Use of quince clone as an indicator for bark necrosis virus, **1961**, III, 94.

plums — sensitive clones from myrobalan seedlings under test as indicator for line pattern virus, **1957**, II, 24. Use of Italian Prune as an indicator for prune dwarf, Cambridge Gage for bark split, and peach seedlings for necrotic ringspot and peach green mottle viruses, **1959**, III, 99.

strawberries — use of *Fragaria vesca* and Royal Sovereign, **1955**, IV, 153.

Virus-tested clones — *see under* the name of the fruit.

Virus testing– — *see also under* Virus diseases, indicator plants.

cherries — use of serological tests to detect cherry leaf roll, arabis mosaic and

Virus testing–cherries–*continued*

raspberry ringspot viruses in crude cherry sap from infected trees; method reliable in early spring, but not after mid-May, and not yet generally applicable, **1961**, II, 29.

strawberries — selected plants are tested for their virus status by runner-grafting to the wild strawberry (*Fragaria vesca*) and Royal Sovereign, **1955**, IV, 153. Presence of a latent virus in the East Malling clone of *Fragaria vesca* confirmed, **1956**, II, 28. **Erratic transmission of strawberry viruses by grafting excised leaves**, by R. Cropley; a technique in which excised terminal leaflets are grafted onto the petioles of indicator plants was found unreliable for transmitting strawberry viruses from commercial varieties to *Fragaria vesca*, **1957**, III, 124.

Virus vector studies — *see under* the name of the virus.

Walnuts — notes on, **1954**, II, 26; **1955**, II, 29; **1956**, II, 14; **1957**, II, 10; **1959**, II, 10; **1960**, II, 12; **1961**, II, 12. Following the wet summer many of the nuts had imperfect shells but Secrett and Stutton Seedling had a high proportion of good quality nuts, **1958**, II, 11.

Water– — *see also under* Irrigation; Soil moisture studies.

,, culture — *see under* Solution culture.

Waterlogging — *see under* Rootstocks, apple, general.

Water relations of plants — **Water and plant growth**, by Prof. T. A. Bennet-Clark, **1954**, III, 47.

,, sprinkling — *see under* Frost damage investigations, water sprinkling.

Wax — notes on waxes on leaves and fruits, **1960**, III, 41, 42; **1961**, II, 10.

Weather conditions — *see also under* Farm, Experimental, reports; Meteorology, horticultural.
annual reports on weather conditions, **1954**, III, 99; **1955**, III, 73; **1956**, III, 97; **1957**, III, 79; **1958**, III, 63; **1959**, III, 63; **1960**, III, 61; **1961**, III, 67.

Weedkillers–

black currants — *MCPB* applied to Mendip Cross at up to 8 lb per acre in August caused no serious damage, **1958**, II, 11; **1959**, II, 9.
Monuron at 5 and 10 lb per acre reduced the growth and yield of the bushes and did not control groundsel, **1959**, II, 9; severe damage at 10 lb per acre, **1960**, II, 11.
Simazine applied in November at 2½ and 5 lb per acre gave virtually complete weed control, except for bindweed, for 12 months, **1959**, II, 9, and no reduction in growth or yield in three successive years; bushes receiving simazine at the 5 lb per acre rate cropped better than those given 'normal cultivation', **1961**, II, 11.

raspberries — *MCPB* applied in August to six varieties severely damaged only one, **1959**, II, 9.
Monuron at 10 lb per acre caused typical chlorosis of the leaves on the fruiting cane but not on the young cane, **1959**, II, 9; damage much increased after the second application, **1960**, II, 11.
Simazine applied at 2½ and 5 lb per acre in November had no adverse effect on yield for the third successive year, **1961**, II, 11.

strawberries — *CIPC* at 1 lb per acre and propham at 6 lb per acre applied in November two weeks after planting reduced the maiden crop of Redgauntlet and Cambridge Favourite, **1959**, II, 9.
2-4,DES (S.E.S., Crag Herbicide) at 3 or 5 lb per acre at monthly intervals before strawing and again after fruiting gave satisfactory control of fat hen, nettles and groundsel without any reduction of crop or appreciable damage, **1956**, II, 14; applied monthly at

Weedkillers–strawberries–*continued*

3 lb per acre during the summer plus dinoseb at 2 lb per acre in the autumn gave good weed control without appreciably harming Royal Sovereign, **1957**, II, 9; **1958**, II, 11.
Simazine applied on a runner bed at ½ and 1 lb per acre at the beginning of runnering in June gave excellent weed control and no reduction in the number of runners produced, **1961**, II, 11.

top fruit — **Weed control under fruit trees**, by G. C. White; of the oils tested, diesel oil and tractor vaporizing oil (either alone or mixed in equal parts) seem to be the most useful. Applications of coarse sprays should give an adequate wetting of the foliage without excessive run-off. Weeds should be sprayed after they have started growth in the spring, when 4–6 in. high; three or more sprays during the season may be necessary to control regrowth, **1956**, IV, 184. Confirmed that oil sprays can give satisfactory control of couch grass if applied when it is 4–6 in. high, **1957**, II, 19. Effects of diquat and maleic hydrazide being studied, **1959**, II, 8. Simazine at 2½ and 5 lb per acre and monuron at 10 lb per acre applied to a range of young apples and pears; no damage to apples, **1960**, II, 9; **1961**, II, 10, but signs of monuron injury on one Conference pear tree in the year following application, **1960**, II, 9, and on the Comice guard trees, **1961**, II, 10.

Weevils — *see under* the common names of the weevils.

Wheat — *see under* Corn crops and trials.

Whitbread's Golding Variety — *see under* Verticillium wilt, hops, tolerant varieties.

Williams' Bon Chrétien — *see under* Incompatibility, pears, on quince rootstocks; Virus diseases, heat treatment, pears.

Wilt — *see under* Verticillium wilt.

Wind — *see under* Katabatic winds; Weather conditions.

,, damage — notes on, **1956**, I, 3. **Summer gale damage to apple rootstock and pruning trials in 1956**, by A. P. Preston; discusses damage to twelve-year-old apple plantations on two different soils, in relation to rootstock selection and method of pruning, **1956**, III, 85. **The effect of a summer gale on leaves of the apple rootstock Crab C**, by H. W. B. Barlow and C. R. Hancock; the effect of the gale on 29th July 1956 on leaf growth was shown to be mainly due to the associated fall in temperature, **1957**, III, 96. One of the major factors in the irregular cropping of pears, **1958**, IV, 143.

,, -flow — *see under* Tree density, apples.

,, machines — *see* Frost protection.

Windbreaks — an increase of 120% in the yield of Conference pear was obtained within a distance of four times the height of the screen, **1958**, IV, 144.

Winter moth (*Operophtera brumata*) — *see also under* Spraying, pre-blossom.
observations on, **1958**, IV, 119. **Notes on the biology and identification of some allies of the winter moth (*Operophtera brumata* (L.))**, by J. B. Briggs, **1955**, III, 141. Effectively controlled by DDT applied at green cluster, **1961**, IV, 118.

,, storage of hardwood cuttings — *see under* Propagation, rootstocks, hardwood cuttings, winter storage.

Witt, A. W. — an appreciation, **1956**, 1.

Witches' broom, clover — *see under* Clover witches' broom.

Woolly aphid (*Eriosoma lanigerum*)– *see also under* Insect fauna.

control — high volume applications of phosphorus compounds at petal-fall recommended; BHC also effective, **1961**, IV, 119.

parasite (*Aphelinus mali*) — notes on, **1954**, III, 139.

resistance — *see under* Breeding, top fruits, apples, resistance to woolly aphid; Histological investigations, apple, rootstocks, resistance to woolly aphid.

resistant rootstocks — *see under* Rootstocks, apple.

Wormald, Dr. H. — an appreciation, **1955**, 15.

Wye–East Malling breeding project — *see under* Breeding, hops.

Xiphinema diversicaudatum — *see under* Eelworms, soil migratory, virus vector studies.

Yellow crinkle, strawberries — severe symptoms seen on Huxley, Cambridge Favourite, Deutch Evern, Mme. Lefebvre and Cambridge Vigour; apparently distinct from crinkle disease and seems not to be transmissible by aphids, **1957**, II, 25.

,, net, hops — *see under* Hop yellow net.

Yellows, of Climax — *see under* Strawberries, Climax.

Yellows group of viruses — *see under* Green petal virus, virus vector studies; Leafhoppers, virus vector studies; Rubus stunt virus; Sudden wilt, blackberries.

Zineb — *see under* Apple scab, field trials; Beneficial insects and mites, predators, fruit tree red spider mite (**1961**, III, 109).